The Chemical Age

A Weekly Journal Devoted to Industrial & Engineering Chemistry

VOL. I. JULY 19, 1919 No. 5.

Contents

Editorial Notes: The London Meeting; Supply of Medicinal Chemicals during the War; Chemical Markets of Latin America; Patent Law Reform 115-116
Society of Chemical Industry: Special Reports of the Annual Meeting in London 117-128
The Chemical Industry Club (with photographs) ... 129-131
The International Potash Situation 131-133
Chemical Matters in Parliament 134
Patent Law Reform 134
Medicinal Chemicals: National Health Insurance Commission's Report 136-137
Reviews 138
Ramsay Memorial Fund 139
From Week to Week 140
References to Current Literature 141
Patent Literature 142-144
Stocks and Shares 144
Market Report 145-146
Obituary 146

NOTICES:—All communications relating to editorial matters should be addressed to the Editor who will be pleased to consider articles or contributions dealing with modern chemical developments or suggestions bearing upon the advancement of the chemical industry in this country.

Other communications relating to advertisements or general matters should be addressed to the Manager.

The prepaid subscription to "The Chemical Age" is 21/- per annum for the United Kingdom, and 26/- Abroad. Cheques, P.O.O.'s, and Postal Orders should be payable to Benn Brothers, Ltd.

Editorial & General Offices—8, Bouverie Street, London, E.C.4.
Telegrams: "Allangas, Fleet, London." Telephone: City 9852 (4 lines).

This Week's Meeting of the Society of Chemical Industry

THE programme arranged by the Society of Chemical Industry in connection with their annual meeting, has provided a week full of event for those members of the profession who assembled in London. Every day, in fact, has been filled to its utmost capacity with proceedings both technical and social, and the smoothness with which such an immense programme has been carried out speaks volumes for those in whose hands the organisation rested, in which connection special reference should be made to the energy of Dr. Stephen Miall. The meeting this year was conspicuous in more than one direction, for the alleviation from the stress of war had permitted of arrangements being made on an ambitious scale. In fact, one has to go back to the International Congress of Applied Chemistry, which was held some ten years ago, to find anything approaching a parallel. During the war the time of industrial and scientific chemists was so fully occupied, and they were scattered in so many directions, that the annual meetings were necessarily of a somewhat formal and restricted nature. Added importance was given to this year's meeting by the fact that an invitation was extended to those whose names are household words in the chemical spheres of Allied nations. Meetings were arranged of the Inter-Allied Federal Council, in connection with which there were present some twenty delegates from France, Belgium, Italy, and the United States, including M. Paul Kestner, president of the Société de Chimie Industrielle.

Considerable interest was displayed in the conference of the Chemical Engineering Group, which was the first meeting of its kind, and at which some half-a-dozen papers, bearing upon power supply in chemical works, were read, and the subject was thoroughly discussed in all its modifications. It is to be noticed from the report of the council that they have recognised this independent group, which originally was the unofficial offspring of a small body of enthusiasts in London. The "group" system is one which we believe should be much more fully extended, for—in contrast to local sections which must necessarily consist of members engaged in all manner of different branches of their work—the group is composed of specialists in a single subject, holding meetings at different centres all over the kingdom to suit the convenience of its members. The Chemical Engineering Group, with a membership of 500, is the only one in being at the moment, but the various tastes were accommodated at this year's meeting by the organisation of distinct conferences. It was a happy thought which prompted the organisers to hold their technical meetings in the heart of the City, so that the importance of the industry might be brought to the very door of the business world. Perhaps this may be taken to mean that there is at last some appreciation of the fact that prosperity lies in interesting the commercial and business community rather than by making a direct appeal to the academic interests.

A full report of the proceedings, up to Wednesday night, will be found on other pages. With regard to our special report, we have only one complaint to make. If our summaries of the various papers may appear a little attenuated, we can only put forward the excuse that the rules of the Society restrict the abstracts of papers to 500 words. Such a restriction at the present day is certainly an anachronism, for while in the past the learned societies and associations may have profited by adopting a policy of self-interest, there can be no question that publicity in every direction is the *sine quâ non* of the present campaign. Certainly the Journal of the Society, with its full accounts, will shortly be available to many of those interested, but the technical Press permeates to quarters which official proceedings can never hope to reach; and thus the Society is

deliberately depriving itself of a publicity that could not fail to be of benefit to the chemical industry in general.

Supply of Medicinal Chemicals during the War

We give this week an extract from a report which has just been issued by the National Health Insurance Commission, describing the efforts which were being made during the War to maintain and augment the supplies of medicinal chemicals. Before the War we were largely dependent upon Germany for the supply of many highly important synthetic drugs, and other medicinal substances, also for many of the vegetable products which form the raw material for a number of everyday remedies. The chairman of the Health Insurance Joint Comittee points out that there were in the summer of 1914 no reserves of these articles beyond such stocks as were ordinarily kept to meet normal demands, and the sudden outbreak of War threatened to cause a great shortage of many of the most essential products. The task of maintaining the supply was entrusted to the Insurance Commissioners, and the report sets out in detail the steps which were taken to this end. Considering the magnitude of the task, the unknown paths which had to be trodden, and the comparatively few number of men who were really conversant with the technique of the business, it was a remarkable achievement that the needs of the Forces and of the civil population were at all times successfully met. This work is, in itself, memorable, and one of which our chemists in general must be justly proud, for it clearly emphasises that, though we were often slow to action, we can, when the need arises, accomplish in an insignificant period of time what it has taken German plodders years to develop. In the organisation of this new industry invaluable assistance was rendered by the Royal Society, so that—thanks to the energy and enterprise of the chemical manufacturers—the provision of drugs has been placed on a permanent basis. In fact, the fine chemical industry has been so greatly extended and developed during the past four and a half years, that the country is now capable of manufacturing on a large scale all those important medicinal articles which before the War were practically a German monopoly.

Once again, the "treasures of tar" have been turned to account, and the manufacture of synthetic drugs, such as novocain and the antipyretics (almost exclusively produced in Germany), was quickly mastered by our own chemists. In this connection it may be mentioned that prior to the War a large proportion of our own output of coal tar, or its partly worked-up products, was exported to Germany, and, in return, we received back the manufactured articles which the War has taught us to make for ourselves. Although many other medicinal substances, apart from coal tar products, were included in our imports from Germany, it was mainly in the making of the coal tar synthetic remedies that she was pre-eminent, and that position was due, not to any lack of skill or invention on the part of British chemists, but to the high degree of organisation attained by the German chemical industry, which made it possible to convert the by-products of the aniline factories into medicaments of high therapeutic and commercial value.

Chemical Markets of Latin America

Now that shipping and international trade are being gradually restored one of the fields to which the British exporter naturally turns is Latin America, a continent in itself with unlimited natural resources, the development of which has been hampered by bad government, unscientific business habits and indifferent financial methods. Before the war Germany had cultivated the markets of South America with great zeal and no small measure of success. During the war, cut off as the South American nations were from Europe, the United States made an effort to fill up the gap, and to establish her commercial influence as supreme. Geographically she has an advantage which no amount of effort on the part of European nations can cancel; on the other hand, the South American's self-pride and especially his resentment of patronage from the Northern States is a point in our favour.

The immediate question for ourselves is the policy to be adopted by British manufacturers for adequate representation in the chemical markets of South America. In this matter the United States is already moving. The Washington Bureau of Foreign and Domestic Commerce contemplates the appointment, if the appointment has not by this time been made, of a chemical engineer with such a knowledge of South American commercial needs as will qualify him to make a survey of chemical and allied markets. The salary, it may be noted, is $10 per day with $4 allowance for subsistence, and in addition all travelling expenses are to be paid. This is one of the cases in which the United States Government gives its aid to the development of United States industry, without attempting to run American business itself.

Patent Law Reform

It was hardly necessary for the Conference which met in London last week to establish an Institute of Patentees, to make out a case for the reform of our Patent Law. The need of reform has long been a commonplace among those who have to deal with the Patent Office, and the only point for discussion is how best to remove the existing grievances. Two points especially engaged the attention of the Conference. The first was the need of an extension of time for the patents which have been held up during the War. The equity of this claim seems so obvious that it ought only to be necessary to point it out to the Patent Authority to have it recognised; but the departmental mind requires an astonishing amount of evidence and pressure to be convinced of any need for action. The second point was the exorbitant cost to which the British patentee is put, and which can only be explained on the theory that the inventor is regarded as a pestilent type of fellow to be suppressed or discouraged, instead of one to be stimulated and helped. It was stated at the Conference that the British Patent Office, in 1917, made a profit of about £170,000—which simply represents a repressive tax on the inventive genius of the nation. A deputation has been appointed to wait on the President of the Board of Trade, and there should be no difficulty to making out a strong case.

Annual Meeting of the Society of Chemical Industry

Federation of Inter-Allied Chemical Interests.

The annual meeting of the Society of Chemical Industry was held in London from July 15th to the 18th, inclusive, with a crowded programme of technical and social events on each of the four days. Apart from this the Inter-Allied Federal Council held its meeting on Monday at the Salters' Hall. On Tuesday morning members were welcomed at the Mansion House by the Lord Mayor, after which the presidential address was delivered by Professor Henry Louis, D.Sc. On Wednesday the Society met in two sections. One sectional meeting was devoted to the new Chemical Engineering Group, at which six papers were submitted and discussed. The other section devoted itself to Empire Sugar Production. A miscellaneous set of subjects, such as dyestuffs, drugs, fermentation, and tanning, was dealt with on Thursday, whilst Friday was given over entirely to enjoyment. The report that follows carries the proceedings up to the close of Wednesday. Our report of the remainder of the programme will appear next week.

FOUNDED in 1881 and incorporated by Royal Charter in 1907, the Society of Chemical Industry, which now embraces 5,236 members, as compared with 4,826 at this time last year, opened its annual meeting on Tuesday, at the Mansion House, London, where the members, headed by their President, Professor Henry Louis, of Armstrong College, Newcastle-upon-Tyne, received a hearty welcome from the Lord Mayor (Sir Horace Marshall).

The Lord Mayor's Welcome

THE LORD MAYOR, in welcoming the members of the Society to the Mansion House, said it was known how much this country and its Allies owed to chemistry, and he felt that the Society of Chemical Industry had a special right to a special welcome to the City of London, because the City of London was the great centre of commerce, and chemistry had sometimes been described as the handmaid of commerce. He was not sure that it did not merit the title of Mistress of Commerce, for the cause of commerce was certainly determined by the operations of chemistry. The far-sighted founders of the Society had done a great service to this country when they organised the chemists into an influential body. To-day there was hardly a thing bought or sold or needed in daily use, from a postage stamp to R 34, in the production of which the chemist did not have an important part. It was a fortunate thing for this country that at the outbreak of war the Government was able, principally, he believed, through the instrumentality of Lord Moulton, to enlist at once through the Society's organisation the services of highly-trained chemists and chemical manufacturers to counteract the war devices of our chief enemy in the field. He could not pretend to know all the chemical discoveries, or the full extent of the impetus to chemical research due to the activity of the past five years, but he did know that British chemists had risen illustriously to the national need and had done literally wonders.

In paying that tribute, they must not overlook the benefits gained by the co-operation of the chemists of the Allied countries. He understood that in connection with the meetings there were now distinguished delegates in London from the chemical societies of our Allies, and they were most heartily welcome. Happily, their alliance with us for the purposes of war was no longer required. Yet the alliance continued. That, it was to be hoped, was analogous to the position of the Allied countries themselves, which joined together for the purposes of the war. The purpose of that union was now passed, but the bonds of it remained, and, he hoped, would long continue. He was very glad to claim the Society's President, Professor Henry Louis, as a son of the City of London. Professor Louis was one of the distinguished men who had received their early training in the City of London School, and who had brought honour to that famous institution. It was a profound pleasure to him, as Lord Mayor of the City of London, to welcome the Society to the Mansion House, and he hoped that their deliberations might be happy, harmonious and good for the community.

The President's Reply

THE PRESIDENT, in thanking the Lord Mayor on behalf of the members of the Society, said they felt and had been feeling urgently the great need the country had for the closest possible co-operation between the technologist and the man of science and the commercial side of our great industries. Those had been too long divorced. Napoleon was not far wrong when he said that we were a nation of shopkeepers. We had, unfortunately, always put the business side before the technical side. We thought more of the man, and, incidentally, paid more to the man who sold the goods than to the man who made them. That was, in principle, wrong. Those who were engaged on the scientific side of technology were anxious to come into the closest possible touch with those who were on the commercial side of the great industries of the country. The fact that the Lord Mayor had received the Society showed that the City of London, as represented by the Lord Mayor, reciprocated that feeling. When both parties felt that close co-operation was to the benefit of both, they might be quite certain that co-operation would be brought about and would be fruitful. The Lord Mayor had truly said that the chemical industry of the country had been one of the greatest factors in winning the war. And chemistry and the allied sciences were going to be leading factors in the reconstruction which must necessarily follow the war. Unless science and scientific technology had the place in the thoughts of the country which it deserved we should be faced with even graver difficulties than one could foresee at the moment.

It was impossible not to have in one's mind the very serious revelations of the last few days as to the diminishing output of fuel in this country. Coal was the thing upon which the whole of Britain lived. Coal was her sole material export, and it was not too much to say that coal supplied us with food, drink, clothing, and all necessaries, and that if the output of coal from this country were stopped for only a few weeks the whole country would starve. Those who had been in close touch with the industry had known for many years that the output had been decreasing; it had only recently been forced upon public attention. In the face of a diminishing output of that most necessary part of the country's life, the only remedy that one could immediately see was to utilise that smaller output to the best possible extent, and to do that was the task essentially of our scientific and technological men. They had not failed in the stress of war, and he felt sure that they would not fail in the strenuous days of reconstruction. He was looking forward with every hope and confidence to the magnificent body of chemists whom we really had in this country once again to step into the breach and help the country in the difficult days which un-

doubtedly were ahead. That could necessarily only be a task in the first instance for the scientist, but it could only be accomplished by close and intimate union between the scientific man, the commercial man and the industrial man. The Lord Mayor's reception of the Society was an augury that commerce saw the need for the scientific man, and, he hoped, welcomed him as commerce had welcomed the Society. He thanked the Lord Mayor not only for his reception, but for all that that reception implied, and he hoped, like the Lord Mayor, that the joint co-operation of commerce and science would once again put this country in its place, and keep it in its place, amongst the nations, which it deserved.

The business of the annual meeting of the Society was then entered upon.

Courtesies between the King, the Prince of Wales, and the Society

The minutes of the last annual meeting having been confirmed, the following telegram was sent to the King :—

The members of the Society of Chemical Industry gathered at the Mansion House on the occasion of their first annual meeting in London since the commencement of the war send to your most gracious Majesty their sincere congratulations on the peace that has been secured by the great victory of your forces in conjunction with those of your Allies, and their heartfelt wish that it may be followed by many years of prosperity and happiness.

The following letter was read, from the private secretary to the Prince of Wales :—

14th July, 1919.

DEAR SIR,—I am desired by the Prince of Wales to acknowledge the receipt of your letter of the 12th inst. addressed to Sir Sidney Greville, in which you ask that his Royal Highness might attend one of the meetings of the Inter-Allied Council of Chemistry which are being held this week. His Royal Highness much regrets that, as he is leaving London to-day for a few days' change after his recent illness, it will be impossible for him to attend, but he sends to the council his best wishes for the success of the meeting.

Report of the Council

The report of the Council was then adopted by the meeting, the President mentioning that the number of members was now 5,236. The report stated, *inter alia* :—

The following chairmen of Local Sections retire :—Dr. R. S. Morrell (Birmingham), Dr. T. H. Butler (Bristol), Mr. D. B. Dott (Edinburgh), Mr. A. T. Smith (Liverpool), Dr. C. A. Keane (London), Mr. William Thomson (Manchester). The following have been elected to succeed them respectively :—Dr. E. W. Smith, Mr. E. Walls, Dr. D. S. Jerdan, Dr. E. F. Armstrong, Mr. J. L. Baker, Mr. John Allan.

The following changes have taken place among the hon. local secretaries :—Mr. R. F. Easton (Bristol), Mr. L. E. Viles (Manchester), both resigned, and Mr. Thomas Fairley (Yorkshire), deceased, have been succeeded by Dr. F. W. Rixon, Mr. L. Guy Radcliffe, and Mr. B. A. Burrell, respectively.

At the Inter-Allied Conference of Chemists held in Paris in April the Society was represented by the President, Professor H. Louis, Mr. W. F. Reid, Mr. Edwin Thompson, and Dr. S. Miall. An important feature of the meeting was the laying of the foundation of an Inter-Allied Federation of Pure and Applied Chemistry. Delegates from five Allied nations were present, but none of these had power to bind the organisation which he represented. A resolution was adopted that in the opinion of the delegates present the formation of such a Federation is highly desirable. A committee of ten was appointed who are to meet in London in July, by which time it is hoped that each of the Allied countries will have sent in its formal adhesion to the Federation. It is understood that Pure and Applied Chemistry will be represented equally in the Federation.

President's Address

The PRESIDENT remarked that it was not too much to say that every single chemist in Great Britain had been engaged directly or indirectly on war work in some form or other, and that no body of men had the right to claim a larger share in the triumphant issue than the chemists of Great Britain, but the chemists had not obtained their fair share of public appreciation. Why was this? Was it because the general public were impressed only when they "see wheels go round," or was it because the chemical worker, unlike too many of his fellow workers in the engineering shops, had stuck quietly and undemonstratively to his job and had not attracted public notoriety by going out on strike or threatening to strike for the most trivial of reasons? In this connection the president paid a tribute of sincere respect to the workmen in the chemical industries, whose industry and energy in carrying out their disagreeable and even dangerous tasks should not be forgotten by the nation in its hour of triumph. Had it not been for these men, Lord Moulton would not have been able to say, as he had done, that the chemical manufacturers of the country had never kept a shell waiting. Speaking more particularly of what the chemical industry had done during the war, the president said that before the war our annual consumption of 100 per cent. sulphuric acid was about one million tons per annum, of which 25,000 tons were oleum; and at the close of the war it was about one and three-quarter millions, of which 310,000 tons were oleum. This increase was not due to extravagance; the strictest economy prevailed in the consumption of this all-important acid. The chemical industry might be proud of the fact that it was one of the very few industries engaged in the manufacture of war material in which haste and waste had not been synonymous terms. The one fact that in an old-established industry like sulphuric acid manufacture the efficiency of production had risen from 78.8 per cent. to 91 per cent., and occasionally even higher, and they had remarkable testimony to the businesslike methods of manufacture devised by chemists even during the strenuous days of war. It was impossible to estimate the magnitude of the sums that might have been saved to the country if all other industries engaged in the production of materials of war had been administered on equally sound economic lines.

In regard to the production of explosives, the president said that before the war our production of picric acid and of trinitrotoluol was less than fifty tons a week. In the course of the war the production of trinitrotoluol rose to 60,000 tons per annum, and of picric acid to 52,000 tons per annum. Even with these developments our production of explosives was less than half of our requirements; for shell filling alone no less than 220,000 tons of high explosives were needed for 1917. Here again the resourcefulness of our chemists came to the rescue by the invention of a new explosive, amatol, consisting of a mixture of T.N.T. with from two to four times its weight of ammonium nitrate. He firmly believed that German chemists had persuaded the German nation, possibly even including themselves, that they were so far superior to the rest of the world in chemical knowledge that any competition with them in this form of warfare would be hopeless. They soon found, however, that British chemists were more than a match for them.

Speaking of the work of the Army Medical Corps, the president said that even the best and ablest of that corps would have been helpless without a due supply of drugs and anæsthetics, and for these we had to rely on the British manufacturers of fine chemicals. At the commencement of hostilities practically the whole of this trade was in German hands, and we imported from abroad all that we required. Here, again, British manufacturing chemists proved themselves equal to their difficult task.

The soap industry was amongst those that were confronted with a series of difficult problems under war conditions. Its main attention was directed to the production of the greatest possible amount of glycerine for the manufacture of explosives, whilst it had at the same time to work with fats of inferior quality, no edible fats being allowed to be employed. Very large quantities of glycerine were required both for the production of nitro-glycerine and to supplement acetone as a solvent in the manufacture of cordite. The distillation of crude glycerine and the preparation of glycerine of high quality suitable for the manufacture of explosives had to be undertaken on a very large scale.

Another important operation was the refining of edible oils and the production of margarine therefrom. This had been accomplished before the war, but only on a relatively small scale, and the extension of these manufactures to meet the demands of the country was another task of the greatest importance, which our chemical manufacturers accomplished successfully.

Again, during the war we had practically emancipated ourselves from reliance upon Germany to the extent that many of the dyes that we require can now be made and are now being made in this country. So far as concerned the work of the chemist and the manufacturer, the problem of producing our own supply of dyes might be said to be well on the way to solution.

As regards glass before the war, we produced heavy glassware, but very little fine glass and practically none for scientific or optical purposes. Elaborate researches were at once set on foot, the problem in this case being complicated by the fact that the raw materials available in this country were not identical with those obtainable abroad. Nevertheless by patient and persevering investigations the difficulties were gradually overcome, and optical and scientific glass of good quality was now being regularly produced in this country. Before the war we made practically no glass tubing at all; to-day we make 15,000 lbs. a week. Before the war we made hardly any safety-lamp glasses for miners; to-day we are making over 80,000 per month; whilst our produce of such articles as clinical thermometers and electric lamp bulbs has been practically trebled.

The main fact that emerged from the mass of detail that he had collected was that our chemical industry had shown itself capable of sustaining successfully the fiercest and most strenuous competition that it had ever been called upon to face. Utterly unprepared for war conditions and apparently unsuited to war emergencies, it had shown itself more resourceful, more energetic and more successful than any of us had dared to hope. He saw in these results a triumphant vindication of the thesis that he had more than once urged, namely that in the teaching of science, and more particularly of scientific technology, we are quite on a par with any other nation. The war had shown that our teachers who had steadfastly adhered to the methods that suit our national idiosyncracies could claim to be justified by the results obtained; we could certainly learn much of the organisation of scientific education and much of the respect due to science from our enemies, but we should assuredly do well to adhere to our own essentially British methods of technical education. When it was borne in mind that Germany had for forty years been applying her science to the purposes of warfare, and that we only began to do so five years ago, we were surely justified in asserting that we succeeded because the science which we possessed available for such application was of a far higher order, and that it was for this reason that we had been able to beat our enemies at all points. This to his mind was the first great lesson of the war. Our scientists and our methods of scientific education had proved their quality; where we fell short was merely in the matter of quantity, and fortunately that was easily remediable. He sincerely trusted that the nation would see to it that it was remedied.

If we were to maintain our leading place among the nations of the world, it could only be by maintaining our productive capacity and increasing our outputs. This was a task that could not be accomplished by scientists and technologists alone; they could but devise and organise the methods by which the work was to be done, but they must call upon the body of workers of the country to execute them. He had worked in many lands and had employed men of many different races and different nationalities, and he said without hesitation that the British working man had no superior as a workman if he only chose to work, and he therefore saw no reason why he should produce less effectively than any of his competitors. He must, however, be taught to grasp thoroughly the great economic fact that only by the nation's work could the nation's prosperity be maintained. We won the war by the huge outputs that our industries were able to produce, and in this way and in this way alone could we hold what we had gained through the years of strenuous competition that unquestionably lay before us.

On the motion of Mr. John Gray, president elect, seconded by Mr. E. V. Evans, the president received a hearty vote of thanks for his address.

The President, in acknowledging the vote, said the past two years' work which he had done as president of the Society had been distinctly hard, but it had been distinctly pleasureable. The council had shown him the utmost kindness and forbearance, and had assisted him in every possible way, and the permanent officials of the Society had worked most courageously and loyally in order to keep the Society in the flourishing condition in which it was to-day. With regard to his address, he would like to impress upon the members the fact that he had been merely the mouthpiece of the chemical industry. The tale he had had to tell had been only edited by himself. The contributors had been the heads of the great chemical industry throughout the country. They had been good enough to furnish him with the material. He thought the history of what our chemical industries had done during the last five years would always remain a brilliant page in the records of the industry of the country.

The members of the Society were entertained at luncheon by the London Section, in the Connaught Rooms, Great Queen Street, Dr. C. A. Keane in the chair.

Inter-Allied Chemical Federation

The afternoon session of the conference was devoted to matters brought forward by the Inter-Allied Chemical Federation, the subject being introduced by Sir W. J. Pope, F.R.S.

Sir W. J. Pope spoke of inter-Allied chemical federation and dwelt on the need for co-operation. A fairly comprehensive scheme for the co-ordination of scientific effort was in course of formation under the direction of an International Research Council. This body was the co-ordinating head of a series of organisations, each dealing with the international aspects of some specific branch of science, among them being the International Chemical Council. Their own Federal Council for Pure and Applied Chemistry would no doubt ultimately represent chemistry as a constituent committee of the British National Research Council. While the precise terms of constitution of these bodies were not yet defined, the draft scheme, rapidly approaching completion, aimed at the organisation of a network of bodies, each representing one science in one country, and each of these units was under the aegis of the National Research Council of its own country and was in communication with the body representing its own science in other countries. Enemy and neutral nations were taking no part in the deliberations. The question of the entry of the Central Nations seemed to be postponed indefinitely. As to neutrals, in a subject like chemistry, with powerful economic potentialities in peace and immense military applications in war obvious dangers attended an alliance with nations with whom we were not inseparably bound by the ties created by the spilling of blood and the outpouring of treasure in the common defence.

Dealing with some of the advantages of co-operation, Sir W. J. Pope said the establishment of an organisation for the compilation and publication of compendia covering the whole field of chemical knowledge naturally fell to an inter-Allied chemical federation; it was a huge task and would call for the co-operative expenditure of vast amounts of effort and money. The whole problem presented by the rapidly increasing bulk of chemical publications was one which urgently called for attention. Comparatively few of the thousands of papers published in our great journals during the last century were essential to the worker. An inter-Allied chemical council would have no great difficulty in selecting all the papers of permanent value and present-

ing them for fresh publication in a new journal. In the chemical journals there was an immense duplication of systems of abstracting papers. One of the objects of an inter-allied chemical federation should be to organise a complete and simple system of chemical abstracts. As to the language to be used, it seemed to be indicated that simultaneous publication of collective chemical works in French and in English would meet the needs of the whole civilised world, as distinct from Central Europe.

A Wrong Idea of German work

Dr. Washburn, in opening the discussion, said, before the war, chemists had been content, to a large degree, to depend upon Germany for the compilations and compendia of scientific literature. It seemed to him that that had been largely due to two reasons, first, that work of such a kind did not require originality or ability of the highest order, and as long as the Germans did it the rest of the world preferred to devote its efforts to work which it considered of greater importance, namely, the carrying out of original research. The second reason was that Germany educated such large numbers of chemists within her borders in comparison with the rest of the world, that she had a great many men to draw upon to carry out such enterprises. Since the war, we had appreciated one of the great dangers of permitting Germany to have undertaken that field of chemical effort, namely, the fact that it was in one respect subtle German propaganda. The world had come to believe that, because of the voluminous character of German chemical literature and the many undertakings which she carried through in connection with chemical literature, chemistry was a German science, a point of view which was not at all justified by the actual value of the chemical work of the nations of the world. The necessity was appreciated now of taking over that important part of chemical work and of carrying it on ourselves. It seemed to them in America that the most practicable method of carrying out the bibliographic work under consideration was not to attempt to finance it or direct it by a central authority organised under the Inter-Allied Chemical Union, but rather for that Union to lay out the field, to decide the different things which were to be done, and to assign the responsibility for each of those undertakings to the different nations gathered together in the organisation, with the understanding that the editorial and the financial responsibility of each undertaking would be centred in the nation to which it was assigned, but that in carrying out the work each nation would make use of chemists and investigators wherever they might be found in the world who were best qualified to prepare the different sections of the work undertaken.

How Abstracts could be done

In connection with the subject of chemical abstracts, there were many difficulties in the way of making that undertaking a central international one, and it was those difficulties which in the past had prevented any co-operative effort whatever in that direction. They in America felt, however, that they wished to do everything possible in bringing about the maximum practicable degree of co-operation in the preparation and publication of chemical abstracts with the maximum saving of time, energy and money which could be attained, and it seemed to them that the best method of accomplishing it, or at all events of starting it, was to arrange a system of exchange of abstracts between the different abstract journals now established, or which might be established in the future. For example, suppose it was understood that in England the editors of the abstract journal arranged with all publications in the British Isles and with certain selected ones from the Continent to receive from those publications their page proofs previous to publication, there would be effected immediately a saving of time. Then from those page proofs the English abstractors would make their abstracts, and those would be put into type for the abstract journal, and page proofs of those abstracts as soon as available would be mailed to America, France, and to each nation which had an abstract journal. The editor of the abstract journal in that country could then make use of those page proofs in his own journal in so far as he found them satisfactory and of the nature which his readers desired. That exchange could be effected between all of the countries publishing abstract journals. If an air mail service was secured across the Atlantic the saving of time would be even greater. At the present time in America, it took, on the average, six weeks between the date of publication of a paper in a European journal, and the appearance of the abstract in the American journals; but with a method of co-operation such as that outlined a good deal of that time would be saved. They estimated that the cost of preparing the abstracts was about 20 per cent. of the total cost of operating their abstract journal, and as much of that 20 per cent. as possible ought to be saved by some system of international co-operation.

Wanted: A New Watt Dictionary

Professor H. E. Armstrong thought the great importance of such an inter-Allied movement lay in the fact that they were for once trying to come together and to work together. Personally, he was satisfied that the advantages referred to by Dr. Washburn had been very much under-painted. A system such as Dr. Washburn had indicated might very easily be brought into action with great advantage from the point of time and of expense, if only they had the will to work together and did work together. During the past twenty years, however, it had been impossible to bring about co-operative action between the Society of Chemical Industry and the Chemical Society. It was only within the last few months that the two bodies had begun to work together in the preparation of abstracts, in the sense that they did not overlap. Twenty years ago the editor of the American Chemical Society's journal and himself had done their very best to bring about a joint scheme of abstracting for the two societies. The Chemical Society was defeated by the Society of Chemical Industry; there were certain individuals connected with it who would not listen. The war had done something in forcing them to come together. It was the one lesson they had learned. Some of the lessons of the war seemed not to have been learned, at any rate, as far as labour went. Whether the higher labour which chemists represented would be more rational or not he had his doubts about. If the Federation could bring about an agreement as to what each one had to do, it would accomplish a great deal. Sir William Pope said the German language was one without literary form, and that the British method of writing had been spoiled by the Germans. He (Professor Armstrong) took the other view. He thought we had all grown slovenly. All the chemical journals were horribly slovenly; there was no literary form in them. What chemists had to do was to regain their literary form. What he wanted to see produced was a book which would compare with that great model which chemists had in days gone by, namely, Watts' Dictionary. The Federation had a mission to carry out in putting something before chemists which would attract them, which would cause them to read, and which would be of some advantage to them as literature—not merely "melting points" and twaddle of that kind.

Dr. Wynne Palmer, F.R.S., said that in this country a distinct effort had been made in the direction of supplementing, and replacing eventually, German works. He quite admitted the difficulty to which Professor Armstrong had drawn attention. It was difficult, however, to arrange those compendia and at the same time give them the literary style which Professor Armstrong desired. It was quite easy to criticise the style of compendia which had been suggested. Whether they could be improved or not remained to be seen, but he thought a start would have to be made with the fact borne in mind that the models of the German journals had been found after long experience to be the most convenient for the purpose of reference; and that was what, after all, was required in a compendia. One wanted to find out whether the substance one was actually investigating had already been produced or whether it was an entirely new substance. Therefore, one did require, and must have, things like "melting points and twaddle of that kind." There was an opportunity at the present time of pressing forward the right kind of literature, and the work ought to be started at once; and one of the most important things that the Inter-Allied Council could do was to give instructions for that great work to proceed. Afterwards, no doubt, the models could be bettered and the kind of thing which Professor Armstrong wanted produced.

Mr. Harold Hibbert drew attention to the poor quality of the indexing of the majority of the French journals. He had recently given considerable attention to the subject of the art of searching chemical literature. Speaking of his own experience as a graduate of an English university, on looking back on that training, the one weakness of it lay in the fact that he had never been taught how to search the literature. In a recent article on the subject, in an American journal, he had attempted to indicate just a general outline which the post-graduate student might adopt, with some idea of assisting him in the work. He had been very pleased, indeed, at the number of letters he had received, asking that the article should be expanded into book form. Unfortunately, he was not in a position to do that; but the one thing that did come to his attention was the fact that in all his labours in connection with consulting work and the question of originality and discoveries of inventions, it was always very troublesome, indeed, to have to go through the French literature because of the very incomplete indexing. If the idea was to make use of merely English and French literature, it seemed to him they were going to handicap themselves very considerably along those lines.

Dr. Lowry said one of the questions on which co-operative effort was very urgently needed was that of holding stocks of uncommon chemicals from which research workers could draw, in order to obviate the necessity of going back to the original raw materials.

Professor Armstrong mentioned that this matter was under consideration by a committee of the Federal Council.

Sir William Pope, in reply, said what he was very anxious to do at the present time was to elicit as wide-spread expressions of opinion and as many suggestions as could possibly be obtained. There was no vote going to be taken on any particular project; he wanted to get all the information and all the diverse views possible. Dr. Wynne, whose experience in abstracting and editing was an extremely large one, had probably set as perfect an example of what Professor Armstrong wanted as was available. The article which Dr. Wynne had written on napthalene, which appeared in "Thorpe's Dictionary," was quite a perfect example of the kind of compendium which Professor Armstrong had described; and if it were possible to see the whole of chemical literature put in a series of monographs of that kind, there would be no need whatever to discuss the question any further. He fancied Mr. Hibbert was under a misapprehension as to what

he had suggested with regard to the French and English languages. He (Sir William Pope) did not suggest that they should only abstract, or only consider the literature that appeared in French and English, but that they should only publish their abstracts and compendia in those two languages. Naturally, they would have to deal with the whole of the scientific literature, no matter in what language it appeared.

The day's proceedings ended with an appreciation by Professor C. Moureu (president of the Inter-Allied Council of Federations for Pure and Applied Chemistry) on the late Sir William Ramsay.

The Chemical Engineering Group

Power Plant in Chemical Works

On Wednesday there was a conference arranged by the Chemical Engineering Group of the Society at the Salters' Hall, St. Swithin's Lane, when the general subject of "Power Plant in Chemical Works" was taken as the basis of discussion. The chairman at the morning session was Professor Henry Louis.

The Chairman, in opening the proceedings, said that this newly-founded Group of the Society had set some of the older sections an excellent example of energy and activity, and he hoped that the way in which the members of the Group were taking their duties might galvanise some of the more staid and lethargic sections into life. The work of the morning was of exceptional interest, and came at the psychological moment Practically the whole programme was devoted to problems bearing directly or indirectly on fuel economy. All who had been connected with engineering work in any sense whatever were aware of the extreme importance from the technical and commercial point of view of exercising the utmost economy in the use of fuel. Possibly in this country we had not been as careful in the use of fuel as we might have been. As he had heard it put on one occasion, one of our difficulties here had been that coal was too cheap, and accordingly they had not treated it with the respect it deserved. He did not think that reproach was likely to be uttered in the future. They were faced, not only with a great increase in the price of fuel—that might not be an unmixed evil—but they were threatened with a very serious diminution of output of coal, and that was a matter of the utmost gravity. Coal was the only material export of any quantity that they possessed in this country, and it was only by the utilisation of this raw material that the country could live. The production of coal was therefore of the greatest and most vital importance to the whole nation. It was only quite recently that the public had been rudely awakened to the fact that our coal production was falling off very seriously. The good British public never saw any trouble coming until it came, but those of them who were in close touch with coal mining had seen it coming for very many years. Many of them had no hesitation in saying that with the Minimum Wage Act the coal production would necessarily fall off, and facts had borne out only too accurately the truth of that prophecy. With every successive increase in the minimum wage there had been a corresponding diminution of output. He believed the coal mining industry was the only industry of any importance which had a definitely fixed minimum wage, and in the same way the coal mining industry was the only industry in which the output per man engaged had been steadily falling off. When faced with definite facts of that kind it was very hard indeed to be talked out of avoiding the definite conclusion they pointed to. He was personally convinced that the low outputs to-day were due to the high minimum wage—the fact that whether a man liked to work or not he got his pay. Many men were quite satisfied with their minimum wage, and as long as that position stood they were necessarily faced with low production. It was the duty of the members of the Group to take care that, be the output great or small, it was utilised to the last fraction. That was the big problem before them. The work they had before them was of national importance quite as much as individual.

Professor Louis concluded by saying that the ancient City Guilds, of which the Salters' was one, were associations of men engaged in any one particular branch of commerce or industry. They were perhaps the most democratic institutions that could be imagined. Every craftsman had a free and equal voice in the conduct of affairs. It was not an industry dominated by a relatively small caucus, but freely and democratically worked for the common good. These ancient guilds were in many senses the predecessors of our modern trade unions, but there was one essential difference between the point of view of the guild and that of the trade union, namely, that the ancient guilds punished a man and fined him if he did too little, whereas the modern trade union fined a man if he did too much. He believed that gradually and slowly the lesson would penetrate through all ranks of the nation. The greatness of Britain had been built up by the industries which these old guilds directed, and if they of that later day wanted to maintain their industries they would have to follow on the same lines. The nation must produce to the utmost of its capacity, and must utilise what it produced to the best possible advantage. The first part of that problem was essentially a problem for the worker; the second part was essentially one for the scientist, and that was why they met in that place to discuss that particular aspect of the question.

M. Paul Kestner, responding to the chairman's invitation, said he spoke not only as a sincere friend of England, but as a man attached by many bonds to the English chemical industry. If his career had been successful, it was because of the kind welcome he had received in the early days from chemical industrialists in this country. Here he found more assistance than in any other quarter to which he had gone. One often heard English people talk of English leanings towards routine and conservatism, but he was glad to say that this was not the case at any rate in chemical engineering. One might say that the first page of chemical industry was written in this country; it had its origin here. When English people wrote about chemical engineering matters, they often forgot that English names which were scarcely known at all in England were quite familiar abroad. He instanced the name of Howard, the inventor of the vacuum pan, as one which was most familiar to them abroad, but almost unknown in England.

Waste heat boilers and pulverised fuel in Chemical factories

By Captain C. J. Goodwin

This paper discussed the various sources of waste heat available, and the economic advantages to be obtained from their use. The gas and coke oven industries are probably the principal users of fuel in the chemical industry, and surprise is expressed by the author that so little has been done in the past to utilise the available waste heat in suitable cases. In gas works, coke is no longer a drug upon the market, and steam is required for producers and various processes. In these and in coke oven plants working regeneratively the objection may be raised that if any more heat is taken out of the gases their temperature would be insufficient to maintain a proper draught. Induced draught would overcome this objection, and given suitable conditions for utilising the steam, waste heat boilers should be quite remunerative after allowing for the power required to drive the fans. A possible arrangement is illustrated of a waste heat boiler designed by the Bonecourt Waste Heat Boiler Company, and ordered as a trial installation for a standard set of continuous vertical retorts working under natural draught. By adjustment of the dampers, the volume of gas passing through the boiler can be adjusted to correspond with working requirements. The gases enter the boiler at 700° C., and are purposely designed to leave at 300° C. in order to leave sufficient draught in the chimney; a better utilisation of the gases would be possible by using induced draught. A boiler working with the waste gases from a single retort setting will give 500 lb. of steam per

hour at 100 lb. pressure, so that a gasworks comprising say 60 retorts could raise 7,500 lb. of steam per hour from and at 100° C. in return for a capital outlay of about £4,000, and with relatively small operating costs.

Discussing the features of pulverised coal, the author states that it is almost comparable in use and convenience to fuel oil or industrial gases, and combustion is smokeless and very complete. Temperature control and variation are easy, the desired temperature is very quickly attained, there are no stand-by losses or loss of fuel as on a grate when a furnace is stopped, there is less ash left for disposal, and overloads up to about 200 per cent. can be quickly met. For chemical and metallurgical work it is possible to maintain either an oxidising, neutral or a reducing atmosphere. Screenings and coal dust can be used to advantage in the powdered form, and no grading of coal is required. Apart from the possibility of using coal of inferior analysis, the author has previously suggested that the semi-fuel resulting from low temperature carbonisation, and particularly the dust inevitably resulting during transport owing to its rather friable nature should be utilised in powdered form. A valuable report has recently been issued by the Fuel Research Board.

Finally, reference is made to colloidal fuel, in which pulverised fuel is added to oil fuel. Various mixtures of this kind have already been successfully tried, using inferior materials such as coke, coal tar, petroleum pitch, wax tailings, &c.

Captain Goodwin did not read the paper, which had already been circulated, but made some additional observations. When he was asked to contribute to the conference it was not known that there would be such a sensational increase in the price of coal. Of all chemical industries, the manufacture of gas was likely to be most affected. It was quite a debatable point whether chemical factories before the war were using their fuel in such a way that, after allowing for all charges, and bearing in mind the total amount of plant and power involved, the cost was as low as it might have been in relation to output. In the future, chemical factories would be judged by what they did both in regard to the national interest and to their own interest. With the present price of coal every source of waste heat was worthy of serious consideration and examination. With regard to low temperature gases, he would draw particular attention to water heaters. In a great many factories a good supply of hot water was very necessary for process work, and even the hot water used to cool the burners of powdered fuel installations might be used, and be a source of economy, though, of course, a small one. When waste heat boilers were first thought of, the chief consideration with regard to their use was really non-interference with the operation of the primary furnace. Nowadays, by the use of artificial draught, these difficulties could be overcome, and the installation of these fans usually paid for itself. Turning to the question of powdered fuel, Captain Goodwin said the use of this was for a long time considered a failure in this country, because, he thought, except in the cement works, it was not really properly understood, and the principles of its application had not been fully worked out. Nowadays it really must be looked to as a serious factor, particularly when it was realised that in America alone eleven million tons were burned annually. In this country he thought they would have to confine their attention to semi-fuels, anthracite dust, inferior coal, and lignite. The question of flame temperature was of very great importance, and he believed that he had omitted to refer to the fact in his paper that moisture content would have some part to play. As an alternative to the use of an economiser and perhaps the waste heat boiler, an interesting suggestion had been made that furnace gases should be passed through a brick recuperator or regenerator in which the secondary air for powdered fuel burning was passed to be pre-heated before entering the furnace. That, of course, would lead to some economy.

Discussion

Dr. W. R. Ormandy said that those who had read the Government reports on the utilization of electricity in connection with fuel-saving were aware that they were merely preliminary and open to a good deal of controversy; and he thought the greatest care should be exercised in not making statements as to possible economies in view of the fact that such statements were frequently used in the wrong way by people who were only too willing to take hold of a catch phrase and use it in connection with the miners' agitation. It must not be forgotten that a vast amount of fuel was wasted, because, as yet, there was no possible prospect of being able to use it with greater economy. Much was said about the waste of fuel in steam raising. It had been his duty to examine the efficiency of many scores of large ranges of steam boilers for industrial works, and in almost every case these large concerns had economisers and super-heaters. One source of economy would be the keeping up of the CO_2 percentage, because if that was allowed to get down below 10, the wastage was great; above 10 per cent., there was little to be saved. The growing cost of material and power made it well to find out at what point it became worth while to put in an induced draught. In some cases, he was dubious; but he knew of collieries now using roofing shale, which it would be impossible to use were it not for the application of an induced draught. A great deal more information was needed as to the grade of fuels which could be used. If it were possible to use a powdered fuel which had previously been made subject to a low temperature distillation, it opened up great possibilities. He hardly liked to consider the condition of a town like Nottingham or Leicester, if all the boilers were supplied with a 25 per cent. ash fuel, a large percentage of which went up the chimney. The question of utilizing comparatively low temperature gases seemed to him bound up very closely with the question of finding some metal or alloy or method of treatment which would enable them to resist the corrosive effects of sulphur dioxide. Finally, he would like to ask Captain Goodwin whether he had any records as to the temperature which could be attained, for instance, in brick kilns, using coal dust fuel with cold air, and, alternatively, with hot air, assuming that the fuel used was of good average calorific value.

Mr. L. C. Harvey said that he made an investigation last year on this subject in America, and was particularly struck with the progress made during the last three or four years. The old difficulties with regard to using powdered coal were, first of all, the accumulation of ash and slag, and, secondly, the cutting away of the refractory brick work. With modern types of pulverisers and fine pulverisation, those two difficulties had been entirely overcome. Boilers now were being fired with pulverised coal very successfully indeed, straight-line efficiencies of 75 to 85 per cent. being obtainable with fuels not previously utilizable at all. Sir Auckland Geddes had recently stated that a loss of 7d. per ton on coal delivered in London was due to smalls. It must be the case that a considerable quantity of small coal dust was still left at the mines and was not of saleable value. In America, quite recently, the lowest grade of fuel, the anthracite pit wash, containing about 30 per cent. of ash, had been dried and pulverised and used at the Susquehana Collieries, and these results with anthracite slush were so good, showing a boiler and furnace efficiency of 80 per cent., that a new boiler house of about 4,000 h.p at one of their collieries was now being fitted with pulverised coal burners, and they would now only use anthracite slush, which had been considered valueless. One of the secrets of success was low velocity of primary air, and, therefore, low velocity of gases through the boilers or furnaces. Sixty to seventy per cent. of the ash should be deposited in liquid or solid form in the combustion chamber; 20 or 30 per cent. might perhaps be deposited elsewhere in the form of very fine dust, and not more than 2 per cent. of the very finest ash possible would be emitted from the stack of an installation, and that 2 per cent. of the ash content of the fuel could not be more objectionable in a district than the clouds of smoke which were now emitted from boiler house stacks. He had made a practical study of many installations in America and had put forward schemes and propositions to engineers in this country, showing very considerable savings indeed; but the engineers asked him for concrete working examples, and these, of course, could not yet be produced. In the chemical industry one of the chief deterrents for small works from using pulverised coal was the cost of the initial installation of the plant, but it was quite probable that very snortly pulverised coal would be available for supplying to small consumers. That would mean that they would not have to put down pulverising plant at all, but would be able to purchase pulverised coal daily or every other day and only to instal in their works self-contained automatic feeder and burner units. These little machines were worked very satisfactorily in America, required little or no manual attention, and for chemical processes the temperature could be regulated automatically by thermostat control, so that once the canister of fuel was put on the hopper, the subsequent operation was automatic. He thought that from the point of view of cost, pulverised coal ought to be a very attractive scheme to-day.

Capt. Sinnatt, who spoke more especially of the colliery conditions in Lancashire, said that if powdered coal had any future at all, it had

a very great future in the utilisation of stuff which could not have been utilised hitherto, and the material was actually on the spot. It was not being recovered at present, because its recovery was not thought worth while. In Lancashire there was a large production of a form of cannel with a considerable percentage of ash, and at present it was of practically no use, though an attempt was made to use it during the war for the recovery of low temperature distillation products. Although extremely hard to break, it was extremely easy to grind. A good deal more chemical study of coals was necessary, and he felt that, as a Society, they ought to apologise for the comparatively little that had been done on this subject.

Mr. H. M. Ridge said that there were some points on which he was rather at issue with the author of the paper. The utilisation of waste-heat boilers was not a panacea for all evils. On the other hand, the best economy of coal was obtained by restricting the heat in use really to the primary object which was desired. Take the case of puddling furnaces, if an excessive quantity of coal were burned for the puddling furnaces, an excessive quantity of waste gaseous products was, of course, produced, and then if these were sent through a waste-heat boiler it was true that heat units were recovered. But that was not the primary object, which was to make puddling iron. The waste steam boiler was one way out of the difficulty, but it was a poor way if anything else could be done. During the war he was up against one case where it was desirable to reduce the consumption of coal as far as possible. The operation necessitated the waste gases leaving the furnace at a temperature of about 1,300 to 1,400 deg. C. He utilised this waste gas for pre-heating the secondary air, and actually reduced the temperature of the stack gases to about 250 deg. C. That was a result which would be very difficult to obtain by passing these very hot gases into the waste-heat boilers. It was preferable to pre-heat the secondary air, but while in this particular instance the quantity of gas was very large, he had done the same thing in a number of installations working on a comparatively small scale. In cases in which only one or two tons of coal per twenty-four hours were used, it had been found satisfactory to preheat the secondary air, and a good efficiency had been obtained. In a given case the waste gas left the furnace at about 1,000 deg. C.; the secondary air in that case was being preheated to between 600 deg. and 850 deg., and the reduction in coal consumption had been more than 50 per cent. That recuperation of heat was done in a counter-current recuperator, because when one was working with such a small amount of coal as from one to two cwt. per furnace, it would never pay to put in regenerative furnaces with reversing valves; the labour would cost very much more than could possibly be saved in consequence of the coal economy.

Captain Goodwin, replying on the discussion, said that most of the speakers had dealt with the subject from their own particular standpoint. In a chemical factory, or at any rate in a large proportion of chemical factories, the greater part of the steam load was required for process work, and it did sometimes pay in a chemical factory to burn fuel at one end in order to get steam at the other. With regard to Dr. Ormandy's remarks, as to induced draught in a powdered coal furnace, he submitted that not more than 0.1 in. water gauge was needed. With regard to ash, no inconvenience had been found from ash in large towns. Referring to what Mr. Harvey had said, it was possible to get a straight line efficiency of between 75 and 85 per cent. in a powdered coal installation at almost all loads from 25 per cent. to 225 per cent. That was very important when such installations were considered in relation to mechanical stokers, which were generally only efficient when working at their normal steaming rate, and difficulties were encountered when they were tried under conditions of overload. Passing to another point, he thought there ought to be some organisation by which smalls were collected at some central point in large towns. With regard to Mr. Ridge's remark, it was all very well to say that more heat ought to be extracted in the puddling furnaces, but it was not possible to extract more heat there because the temperature one required was so high. He thought also that in the case Mr. Ridge had described he (Mr. Ridge) had not done sufficiently well in sending his gases up a stack at 250 deg. C. If he got them down to 160 deg. it would be more satisfactory.

At this point Professor Louis had to leave the conference, and the chair was taken by Dr. M. O. Foster. A vote of thanks was accorded to Professor Louis for his presence and for all that he had done to assist in the formation of the Group.

Differential Meters for Measuring Flow of Gases

Mr. John L. Hodgson presented a paper on "Differential Pressure Meters for measuring Gas, Steam, and Air Flows." He said that there were a good many ways of measuring fluids, but he would confine himself to the differential pressure obtained either by means of a constriction placed in the pipe line or by means of a special form of Pitot tube consisting of a cylindrical rod, at one end of which two pressure holes were bored, the one facing exactly upstream and the other exactly downstream. These pressure holes were connected by means of suitable passages and pressure pipes to the indicator or recorder. Mr. Hodgson instanced various differential pressure-producing devices made by his own firm. They were calibrated with water, this method being simpler, cheaper, and, unless very elaborate care was taken, more accurate than calibration by air or steam or gaseous flows. Check tests were, however, taken on actual air, steam, or gas flows with each new type of constriction. The method of calibrating by means of water flows, which he developed in 1909, enabled a new type of constrictor to be quickly tested out, and also enabled the effect of difficult upstream conditions to be allowed for by means of scale models.

Speaking of the Pitot tube, Mr. Hodgson said that it was an extremely easy means of obtaining differential pressure, but it should always be installed with good upstream conditions, or, if these could not be obtained, a traverse should be taken in two directions at right angles. From the point of view of the indicating or recording instrument, the Pitot tube had, in spite of its smplicity, two important defects. The differential pressure produced was usually very small. Owing to the fact that the maximum differential pressure produced depended on the maximum velocity in the pipe line, and that this varied in practice between very wide limits, the indicating and recording instruments would, if the Pitot tube were used as the basis of the measurements, have to be designed to deal with the numerous maximum heads from the next minute upwards, or else the diameter of the pipe-line would have to be altered at the point where the Pitot tube was inserted in order to obtain a reasonable uniformity in the maximum heads dealt with. Because of these defects, he had developed only one instrument for use with the Pitot tube, the differential pressure in all other cases being obtained by means of constrictions placed in the pipe-line. This instrument was called the curved tube manometer. It consisted of a reservoir containing oil, which was connected with the upstream pressure hole, and a curved tube so shaped that equal increments in the velocity past the Pitot tip would cause equal movements of the oil meniscus along its length, which was connected with the downstream pressure hole.

Mr. Hodgson showed a number of slides, and, describing the curved manometer, explained that it was so designed that it could be supplied to work at any maximum head between 15 and 120 mm. of oil. Owing to the beautifully equal spacing scale, accurate readings could be taken down to 1-9th or 1-10th of the maximum flow. He also referred to the extreme importance of the right selection of materials for the various parts of the meter. A meter which was perfectly satisfactory for measuring coal gas had to be completely revised if it was to be applied to the measurment of coke oven gas, carbon dioxide, chlorine, or ammonia. With each new application, new materials had to be chosen and tested. Mr. Hodgson described, with the aid of slides, the well-known Venturi tube, which, he said, when properly designed, was by far the most perfect of all the types of constriction. From the point of view of gas measurement, the smooth curves of the Venturi tube had the extremely important effect of reducing the tendency for deposit to form to a minimum. In any apparatus that attempted to measure dirty gas the only thing to do was to keep the velocity fairly high, to avoid eddying, and have everything as smooth as possible.

Time did not permit of oral discussion upon the paper, but those interested were invited to send in remarks in writing.

Professor Bone on Surface Combustion

Professor W. A. Bone, F.R.S., next submitted a paper on "Recent Developments in Surface Combustion Boilers," in the preparatoin of which he said that he had been assisted by his colleague, Mr. P. St. G. Kirke. Professor Bone said he had heard it stated by experienced blast furnace engineers that the efficiency of their boilers was not much

more than 50 to 55 per cent. He had made careful tests, and in the case of boilers which had been cleaned of dust and were working under the best conditions, he had never got a higher efficiency than about 60 per cent. With regard to boilers fired in the ordinary way with coke oven gas, he did not think the efficiency was much more than 65 or 70 per cent.—more usually 65 than 70.

The application of the principle of surface combustion to the gas firing of multi-tubular boilers proved the possibility of transmitting between 90 and 95 per cent. of the net calorific value of coke oven gas to the water in the boiler. Professor Bone described, with the aid of diagrams thrown on the screen, the successful developments that followed, especially referring to the remarkable results obtained by the Skinningrove system. The next question was to design a rigid system of refractory packing. For this purpose moulded blocks at various angles were used, and the tubes of the boilers made six inches instead of three in diameter. The insertion of the new packing proved very useful. By dispensing with the granular packing altogether they were enabled to use gas that still contained tar without any inconvenience. During the earlier stages of their investigation the problem of super-heat was left over, it being recognised that it was impossible to develop a system for large power station work where super-heats were required unless a satisfactory solution of subsidiary problems had been found. During the war, however, the problem was tackled on an experimental scale, with the result that enabled the boiler design to be modified so as to provide super-heats of the highest degree required in a modern power station. With a return to smaller tubes, and a new spiral form of packing, they obtained excellent results in the Bonecourt patent gas fired boiler. This boiler had a great advantage over the water-tube boiler in that it had no internal pressure tending to burst the tubes.

In conclusion, Professor Bone said they were prepared to make all three types of boilers, the Skinningrove, the rigid system of packing, and the Bonecourt boiler, according to circumstances, but the first-named was more costly than the last, so it was not anticipated that there would be a great demand for the more expensive unit.

Mr. Harold J. Ping gave a description of his own successful use of the Bonecourt boiler and the empirical log which he had made of its working.

Dr. Ormandy asked what was the limit of the poorness of the gas it was possible to employ and whether it was necessary to use pre-heated air when employing gas of very poor calorific quality.

Professor Bone replied that very soon after they commenced their first experiments, they were given the opportunity of testing the boiler tube on a blast furnace as at the Skiningrove works, and he found that he could not induce a very satisfactory surface combustion, but after he had first of all started up the boiler tube with a little coke-oven gas—within about five minutes of the glow—the tubes went on to work quite satisfactorily.

Mr. P. St. G. Kirke said that he believed there would be no difficulty in burning blast furnace gas, but it would not be possible in that case, unless the air had been pre-heated, to use such a long boiler as Professor Bone had shown on the screen in the course of his remarks. Pre-heating of the air would undoubtedly make it much easier to burn blast furnace gas. As to the question of over-all efficiency with a producer, the boiler efficiency was over 90 per cent., but the producer efficiency was not more than 75 to 80 per cent., and that introduced a disadvantage. The proposition only became interesting if by-products could be recovered, and that necessitated a large scheme. With a producer and gas-fired-boiler the stand-by loss was very low. Steam could be got up very quickly and shut down very quickly. Apart from conditions in which it was important to stop steam, it would only be in large schemes where by-products were recovered that a producer and a Bonecourt boiler would be put in.

A good deal of work had been done by himself and Professor Bone in connection with the recovery of waste heat, and most of it had been done with gas engine exhausts, because the gas engine had plenty of power to drive the gas through the tubes.

Dr. Charles Carpenter (who had now taken the chair) said Professor Bone's researches had proved that a steam boiler could be made an economical appliance. If it was desired to convert heat into steam it could be done economically by the means he proposed, always provided that the source of heat, namely, the gas, could be supplied under economical conditions. The boiler could be "switched on" as a steam producing appliance. A very much greater control over the production of gas was possible by means of a producer than could be had with the damper in any of the ordinary forms of boiler.

Low-Grade Fuel for Steaming Purposes

Mr. P. Parrish read a paper on "The Production of Steam from Low-Grade Fuel and a Chemical Works Power Plant." Mr. Parrish said the problem was not a new one, but it could hardly be said that finality in the matter had been reached. Coke breeze was a very indefinite term, and might mean almost anything. Some gas engineers described it as all the material passing through a $\frac{3}{8}$ in. screen. His own experience of the combustion of coke breeze in forced draught furnaces did not confirm the view that the best results were obtained by admitting such a quantity of primary air as would lead to the formation of carbon monoxide, which could be subsequently burned to carbon dioxide. Combustion would be very seriously retarded if an attempt were made to restrict the supply of primary air to such proportions as would lead to the formation of carbon monoxide. With coke breeze high in ash and moisture content, it was necessary to clinker three times per eight-hour shift. The necessity for quick cleaning and re-charging was self-evident.

Mr. Parrish dealt with various important factors, such as the importance of frequent and systematic cleaning of the side and bottom flues of the boilers as affecting the question of "drift" and its possible discharge from the chimney shafts. It was originally thought that the question of drift could be diminished by eliminating the finer breeze. A typical example of breeze was screened and the various percentages determined. The results were in distinct contradiction to what was surmised. They suggested the variation to be due to varying hardness of the coke, probably owing to carbonising conditions. Attempts to increase the porosity of the fuel bed, and to admit of a better control of the air supply to the boilers, thereby reducing the possibility of drift formation, by using a proportion of broken coke, had not been attended with the success that was anticipated.

Mr. Parrish described a centralised power plant, which he strongly favoured, believing that the loss incurred owing to a moderate load factor was more than counterbalanced by more economical running costs, reduced repairs and maintenance charges, and economy in initial capital expenditure. Other advantages of a centralised plant were that force-feed lubrication could be adopted, the pumps and other such plant were removed from the sphere of corrosive liquids and gases, and there were minimum heat losses, due to the absence of several separate services.

Mr. J. H. West said, that he had had some experience of burning coke breeze under a battery of six Lancashire boilers, and was able to make comparative tests between that plant and four Lancashire boilers burning bituminous slack. The great trouble in burning breeze was the choking up of the side and bottom flues. Five out of the six boilers were kept going while one was continuously under cleaning, and that really was not sufficient to keep the area of the flues sufficiently clean to keep the velocity of the gases down. He tried reducing the primary air in order to save steam on the jet, but that resulted, not only in incomplete combustion, but in the risk of unburned carbon monoxide passing on into the main flue and causing explosions. The difficulty was got over by increasing the primary air to a proper figure. These explosions were particularly liable to happen if such precautions were not taken. The main advantage of coke breeze was its cheapness, reckoned in calorific value. The capital cost of the equivalent boiler plant for coke breeze would be 50 per cent. more than for coal.

Dr. Carpenter referred to the Lancashire boiler as a barbarous method of raising steam.

Mr. H. M. Ridge thought that Mr. Parrish had been using rather an excess of steam for blowing in his primary air. This was the more undesirable, because it would give, as a rule, a considerable proportion of water vapour which had not decomposed while passing through the incandescent coke.

Dr. Ormandy said, that the main difficulty in dealing with coke breeze was the deadness with which it lay on the fire grates. He understood that some progress had been made with the moving bar type of grate, working with forced draught. As regards the utilisation of jets, it was very important when using jet steam to have a standard block gauge to test the size of the holes, because they very rapidly enlarged.

Mr. Parrish, in reply to Mr. West's suggestion said that under ordinary circumstances he would certainly not recommend a reduction of primary air. If the primary air was reduced, the combustible matter must of necessity increase, and an explosive mixture would be obtained. He agreed that there were some obscure points in connection with this low-grade fuel but he thought the matter depended upon regulating the primary and secondary air. As to Dr. Ormandy's suggestion, that low-grade material might be more advantageously burned on a moving grate, he had had the opportunity of inspecting an installation where a moving grate was adopted for the combustion of coke breeze, and found it not so satisfactory, though in that case the breeze was not from one particular works. As to the enlargement of the orifice of the jet, after twelve month's operation, the enlargement was very small indeed; the whole thing depended on the material of which the jet was made.

Dr. Carpenter said, that he agreed with Mr. Parrish that this kind of fuel should never be burned in a Lancashire boiler at all. A great deal of this low-grade fuel was produced all over the country, and was increasing in quantity. It only wanted somebody to sit down and devote himself to the problem of how best to use, and the problem would be solved.

Educate the Stoker in Steam Production

Professor J. W. Hinchley, chairman of the Chemical Engineering Group, read the closing paper. It was entitled "Notes on the Operation of a Chemical Works Power Plant." During the war, he said, two little factories came under his care to some extent, one of which had a Cornish boiler, and the other two old Lancashire boilers. As a matter of fact, the boiler plant was a very small consideration with regard to these factories, and he thought he would see what could be done by educating the stoker. He was astonished to find how much could be done in that way. In one case a saving of nearly 20 per cent., and in the other a saving of over 10 per cent., was obtained simply by asking the stoker to do his business and to understand what he was doing. In many small chemical works the steam boiler plant was neglected, and, with the exception of regular inspection by the insurance company, was left entirely to the stoker. During the recent coal difficulties, restriction of supply had compelled most firms to pay attention to the problem, but success in small plants could only be achieved by educating the stokers and giving them an incentive to economical working. Every worker must be made a thinker as well. In the boiler house bad habits had often become established traditions. A little education of the stoker was very desirable. There must be more discussion between stoker and chemist. The stoker should be warned of the effect of leaky brickwork. The outstanding importance of the heat transmission by radiation from the fuel bed should be insisted upon. The stoker in firing should destroy as little as possible of the area of the incandescent fuel bed. The formation of scale in the boiler during work had a most serious effect, and in preventing this, graphite, if used in the highest purity, was extremely effective. The general rule of the good stoker was to keep his fire in constant adjustment to the steam demand, maintaining it in such a condition at the lowest periods so that by fully opening the damper he could obtain in a few minutes the maximum rate of combustion on the fire grate. In studying economy it was necessary to incite the stoker to constant interest, and the best way to do this was to allow him to share the saving he was able to effect by his vigilance. The simplest method was to measure and record the amounts of coal and feed water supplied and pay the stoker monthly one half of the value of the fuel saved on an agreed basis.

Dr. Carpenter said that whatever might be the disadvantages of our present industrial conditions, we had much more intelligent workmen than we had twenty-five years ago. The more we could interest the employees in the particular work they had in hand the more efficiently they would carry out their operations. If the man in charge of the carbonising plants to-day were cross-examined, it would be found that he would answer very intelligently the questions put to him with regard to combustion, the part played by the secondary air, the importance of its regulation, the importance of the indication of CO_2 in the waste gases as being a guide to efficient working, and so on. The man he was referring to would be horrified with the suggestion that there was only 9 or 10 per cent. of CO_2 in the waste gases. He would tell them that unless they had got 17 or thereabouts they did not know their business. A new type of man had been brought in, and he thought a change of this sort would be found helpful in a great many industrial matters. To what extent it would be a set-off against the present high wages and general dissatisfaction one could hardly say, but they were face to face with these conditions and they had to make the best of it. If they found the man, instead of working twelve hours only working eight firing the boiler, there was a great possibility of getting back the extra expenditure by inducing the man to do the eight hours' shift much more intelligently than in days gone by he did the twelve-hour one.

Mr. Howard Cheetham said that in the part of the country where he came from—Lancashire—coal was mostly used in the cotton mill boiler, and it was quite a common and recognised practice, though it was objected to, for the stoker in charge of the boiler to get a commission from the coal dealer. This thing might have a much wider scope than that of a cotton boiler. It was not always easy to "spot" it, but it was well known that it was done.

Dr. Carpenter said that he remembered a case of this kind some years ago, and the reason given for the action that was taken was that the man was not properly paid. If the men were not paid properly it could not be wondered at they took opportunities which the great bulk of them would consider to be illegitimate.

The Engineering Group Justified

Dr. Carpenter, in closing the conference, said that it had been but a faint indication of the conferences which they might hope to hold in the future. Among their most important tasks was to ensure the working together of those whose work was mainly engineering and those whose work was mainly chemical. If they could be brought together, as they had been in Germany, they would accomplish much. No doubt the German chemical undertaking was what it was before the war very largely owing to the completeness of the collaboration between the engineer and the chemist. With regard to laboratory work he would not suggest and could not think that we had been behind Germany at all. We had had the greatest difficulty in the past five anxious years in directing the immense resources of engineering knowledge which the country possessed towards the channel of the chemical industry. That, however, was the work which the Chemical Engineering Group set out to perform. A good example had been set in another direction. It was largely the fashion to-day for a group of men who dealt with some particular branch of technology or science to form a separate society or organisation, but the Group had shown foresight and statesmanship in not falling into that temptation, and in seeing what great possibilities would follow from associating their ideas with those of the mother society of the chemical industry. The co-operation of the chemist and the engineer must be ensured. He was grateful to the Group for the bold step they had taken, for the persistence with which they had stuck to their point in the face of a good deal of opposition, and, he thought he might say, for the success which had attended their first effort in this direction.

Professor Hinchley proposed a vote of thanks to Dr. Carpenter (which was very heartily carried), and said that the Group could not have hoped to justify its existence or to be in the position in which it stood at present if it had not been for the assistance and support of such men as Dr Carpenter and Professor Louis.

Conference on Empire Sugar Supply

Early in 1917 a suggestion was made by Professor H. E. Armstrong, that it would be useful to obtain the latest statistics from the different parts of the British Empire of the production and consumption of sugar, as well as of the possibilities of its extension, with the view of ascertaining whether the Empire could be made self-supporting, at least, as regards this commodity. A committee, consisting of members of the Society, and certain co-opted members from outside, was formed, and this committee presented a long and detailed preliminary report to a sectional meeting held on Wednesday at the Cloth Workers' Hall, Mincing Lane.

The report is described as of a preliminary character. The committee hope to publish at a later date a much fuller

document, giving complete details of all the information collected.

The report states that the British Empire, according to the last returns, had about 3,500,000 acres under sugar, mostly cane, yet the total production from this was less than that of Germany and Austria-Hungary combined, which countries could not have had as much as half that number of acres under beet. Obviously there must be something wrong with our methods, say the committee.

Let us bear in mind that the British Empire exceeds all other States in the production of sugar, yet the United Kingdom occupies the second place, coming next to the United States, as an importer of sugar. It is of particular significance in connection with this last-named fact that, prior to the war, more than 90 per cent. of the sugar imported into the United Kingdom came from foreign countries, and by far the greater portion of this (quite 90 per cent.) was European beet sugar. In fact before the war the importation of raw cane sugar was restricted to the demands of those industries which found raw beet sugar unsuitable for their requirements.

It is added that one of the great difficulties of establishing a beet sugar industry in this country is lack of co-operation between the agriculturist and the sugar manufacturer. Without such co-operation no regular supply of roots can be guaranteed. Unless he has some interest in the factory, the farmer, as soon as he experiences a bad crop, becomes disheartened, and either discontinues the cultivation of beet altogether, or limits the supply. Obviously for its successful working a factory must be run up to its full capacity.

The Earl of Denbigh presided at this particular conference and Mr. A. R. Ling presented the report.

The CHAIRMAN said that it had been the Free Trade principles of this country, and nothing else, which had stopped the sugar beet industry from being adopted in this country years ago. He had pleaded that the industry should be treated as an infant industry, and that fiscal assistance should be given to it; but directly he had mentioned the word "Protection" he had been tabooed. A change of feeling had now taken place which had resulted in Government assistance being given towards the establishment of a factory at Kelham, in Nottinghamshire, which he hoped would mark the beginning of a great sugar industry in this country. In these days when the country was trying to revive its industry, to improve rural housing, to encourage garden cities, to enliven village life, and to make itself self-contained with regard to its supplies in time of war, he thought it was worth a great deal of trouble and sacrifice to establish such an industry as the sugar beet industry, which, wherever it had been started in any country, had proved to be a centre of business and of scientific knowledge to the agricultural community.

Discussion

MR. I. W. MACDONALD dealt with the statistical part of the report in detail, which disclosed the fact that the Empire was consuming over 6¼ million tons of sugar, and at the present time, owing to the great falling off in the crop in India, only 3¾ million tons were being produced, which meant a shortage in the Empire of 2½ million tons. The question where that 2½ million tons were to be produced, if we were to be a self-supporting nation in the matter of sugar, was one which was being considered by the committee. India was a very important factor in the question if the natives could be educated in better methods of cultivation. At present there was an enormous wastage in that country.

SIR FRANCIS WATTS (Director of Agriculture, West Indies) said the report showed that 2 million tons of sugar had to be found for this country, and that we were 1½ million tons short. Where was that amount to be found in British tropical countries? He did not think it would be found, because the condition of the sugar industry was such that no people would venture to put money into those parts of the Empire where sugar could be produced. Whether, by a vigorous and well-thought-out effort, Empire sugar could be produced, rested with the politicians of this country. Unfortunately, from the very beginning, sugar had been the sport of politics, and those countries which had built up their sugar industry into a highly powerful position had done so on a political basis. This country, which had destroyed its sugar industry, had destroyed it on a political basis. If that 1½ million ton shortage was to be produced in the Empire it meant two things—either an expansion of the existing industries, or new ventures with new capital and new land.

Sir Francis proceeded to show that the deficit could not be nearly met by mere expansion of existing areas, and that the immediate shortage would have to be met by non-British countries. Unless some measure of assurance could be given to those who wanted to go into the British sugar industry, they would be ousted by foreign sugar, because it meant merely a natural expansion of that foreign sugar area, whereas with us it was a question of finding new capital, new lands and machinery, under conditions which at the moment were most disadvantageous. Unless something was done to give stability to the industry, Empire sugar would not be forthcoming. If preference was extended for fifteen or twenty years,, this country would get the 1½ million ton shortage; if not, the 1½ million shortage would be got from foreign countries.

DR. VOELCKER remarked that all the questions which had been raised in the report were, to his mind, subservient to the main question, which was practically a political one, namely, what was going to be the agricultural policy of the Government in the future? Were we going to aim at being more and more a self-producing country, or were we going to depend upon other countries and our Colonies, and rely upon the Navy to protect our shores? That was the main thing which would determine the problem under discussion. He agreed with Mr. Macdonald that India was capable of producing a much larger quantity of sugar than it now did. There was great waste in that country in the production, manufacture, and further preparation of the article; but why should we need to look entirely to even a country like India, when there were possibilities in this country of having such a great source of supply of sugar as we had in sugar beet cultivation? As to the argument that there was not enough land, the British farmer, if he found it to his advantage to grow a sugar beet crop, would be quite ready to give up a lot of the land on which he now grew corn and other crops, and grow sugar beet crops.

MR. HOWEL SMITH, who thought India might produce two tons of sugar to the acre; it was entirely a question of the handling of the cane. All the reports pointed to the northern parts of India turning out a much better cane. The trouble seemed to be that the Indian preferred to produce gur rather than sugar. There appeared to be plenty of sugar in the world if those who handled and manufactured it did not waste 50 per cent. of it.

MR. J. W. MCDONALD (who was in the chair at the afternoon sitting said it was possible in a well-conducted factory to get double the quantity of sugar from the cane and still make the gur.

MR. SANDBACK PARKER, speaking of British Guiana, said the possibilities in that country were immense. There was a great difficulty in obtaining labour, but it could be got when once the industry had security. The extraction of sugar from the cane depended largely upon the amount of capital put into the business on an economically sound basis. In British Guiana the great falling off in yield at present was due partly to drought, but largely to the fact that manure supplied had been almost completely cut off during the last three years. In Haiwai, a very large return was obtained, because for over twenty years there had been free entry into the United States, and there had been a protection of £8 to £9 a ton, and therefore it was possible to provide the most modern machinery to extract the last ounce of juice from the cane. The bulk of the Cuban crop, which averaged about 2½ tons to the acre, was grown without manure, and had been maintained at that high level by the wonderful virgin soil coming into cultivation. Having the security of the American market, Cuba could also afford to put in the best machinery. In British Guiana, it would not be economically sound to get 97 to 98 per cent. of the contents of the cane in juice in the way that was possible in Haiwai, but of the fact that there was the by-product rum. In India, sugar was manufactured in a very uneconomical way at present, but with improved cultivation and manufacture, it should be possible to produce two tons to the acre, and more in places where there was adequate irrigation.

SIR ALFRED CHATTERTON said, the demand for sugar in India was largely increasing, and any estimate as to the future and the possibilities of export, had to take into consideration that the consumption of sugar in the country itself would grow very rapidly. It was possible to increase very largely the yield of sugar from the lands already under cultivation, and to bring in a considerable area of new land; but with the economical conditions now existing in India, it was hardly likely that within any reasonable period there would be a surplus of sugar available for export. In a good year he had seen large areas of sugar cane allowed to rot, and finally burned on the ground, because there was not sufficient power to crush the cane. There was no chance of extending cultivation unless mechanical appliances were introduced on a larger scale. Very large areas of land in Bengal had been thrown out of sugar because of the increased rates obtained from paddy and jute. One of the drawbacks in India was the violent fluctuation in price, owing to the juggery coming on to the market all at one time. Something was being done by providing small mills worked by oil engines and suction gas plant, and those mills yielded 10 to 25 per cent. more price than the country mills. The mills were set up by the Government, the ryot paying a certain percentage of the price which he obtained for his juggery towards the running expenses. In that

way the ryot was encouraged to increase the area of cultivation of cane, and in districts where water was available, there would be gradually a concentration of cane growing, and in time much larger mills would be established for the making of sugar.

Professor CARMODY could not understand why such efforts should be made in this country to obtain sugar from beet having regard to the fact that the Empire had such large tropical possessions in which the cane sugar industry was firmly established. Any expenditure which might be incurred would be more profitably invested in introducing improvements in the cultivation and manufacture of cane sugar in the Empire than in growing beet sugar, which required considerable refining. Beet sugar at a certain stage of its manufacture had an offensive odour, and although that could be removed, could any chemist prove that there was not a considerable residue of matter which might be injurious to health, especially the health of children? Cane sugar was undoubtedly wholesome, as was proved by the large amount of raw cane which the East Indian labourer ate and thrived on. He had no objection to beet sugar being used for chemical purposes, but did not think it was as good as cane sugar for human consumption. There was no doubt that in many parts of the Empire, where the production was small at the present time, it would be possible to develop the industry. The problem of labour was a serious one in the West Indies; but in Trinidad it had been got over to some extent by a system of cane farming. The estate owners could not possibly grow the cane at the price they obtained it at from the farmers. Cane farming was a system which might be introduced into other countries, and it had been proved that a carefully-managed central factory buying from cane farmers could be worked at a reasonable profit. He suggested that trained practical men from other Colonies should be sent to take charge of small establishments in India and carry them through the first ten years of their struggle, by which time larger machinery would probably be introduced and capital would be obtainable.¶

Mr. LING said no compound had been submitted to such numerous and far-reaching tests as suchrose, whether derived from cane sugar or beet, and when refined there was practically no recognisable impurity present, and the two were identical. He preferred sugar made from cane, but there was much to be said for beet, and when refined it had 99.9 per cent. of purity.

Dr. THORNE said the report of the Committee gave a great deal of hope for the future in connection with the possibility of producing all the sugar the country required and of producing it in a comparatively short time if the matter was taken up energetically. India offered immense scope for improvement and rapid increase in the amount of sugar, and attention should be given to that country, while at the same time not neglecting the other Colonies. Probably British Guiana was the country next to India which deserved immediate attention.

Mr. W. MARTINEAU, speaking as a refiner, said in his opinion a well-refined beet sugar was quite as good as a thoroughly refined cane sugar. He would much rather refine beet than cane, because it was easier, but he hoped he would never have to do so, as he did not want to use either German or Austrian beet again. He preferred Colonial raw cane sugar to that from either Cuba or Java. Better results were obtained in refining raw Jamaica or Demarara or West Indian sugar than Cuban. The British Empire Sugar Research Association was a very live Association with considerable backing, representing millions of capital, and it was hoped that the Association would do useful work in bringing the Empire back to the position it held seventy years ago, when it had the whole of the sugar industry of the world.

Dr. BYWATERS asked what prospects there were of a beet sugar industry in this country, especially having regard to the price of labour at the present time as compared with the wages paid in India.

Mr. MARTINEAU said that if the English beet sugar industry was really going to be started, he would be glad to encourage it in everyway possible, but he would rather invest money in growing cane sugar in the Colonies than in growing beet sugar in England.

Mr. SANDBACH PARKER thought it was highly doubtful whether beet sugar in this country could compete with the growth of cane sugar under proper auspices in the tropical regions of the British Empire. But there were other reasons which made it desirable to have a beet sugar industry in this country, on general agricultural grounds, and it should have a fair trial to see if it would develop into a paying crop.

The CHAIRMAN (Mr. Macdonald) thought cane would always be preferable to beet. For one thing beet required coal in its manufacture, while the cane supplied its own fuel. What refiners wanted was good sugar of from 96 to 98 per cent., of good colour, without a large amount of glucose, and a sugar that would cool without turning into a tombstone; in short, a sugar that would be economical to work.

The Social Side of the Conference

On Tuesday those attending the meeting were entertained at the Connaught Rooms to lunch by the London Section of the Society. Dr. C. A. Keane presided.

M. PAUL KESTNER (president of the Société de Chimie Industrielle), proposed "The London Section." M. Kestner said he was present as a French delegate of the Inter-Allied Federation, which was an international organisation within which in each country would be created a federation of all the associations of chemistry, pure and applied. The Federation was at present discussing the problem of co-operation. Their ambition was that pure science, represented by the academies, universities, and public and private colleges, should consent to treat as friends those who transferred into the sphere of industrial realisation the great theoretical discoveries.

The CHAIRMAN, responding, said it was hoped to form a true League of Nations for the advancement of the influence of pure and applied chemistry. He urged the members of the Society of Chemical Industry to do all they could to establish their position and to go on to further development.

Professor E. F. ARMSTRONG proposed the toast of "Our Guests," and Mr. C. L. PARSONS (secretary to the American Chemical Society), and Professor BEHAL (Société Chimique de France) replied.

On the evening of the same day members and their attendant ladies were invited to a reception and exhibition of scientific appliances held at the Imperial College of Science and Technology. A large number attended and was received by Dr. Charles A. Keane, the retiring chairman of the London Section, and Mrs. Keane. Some three hundred found their way to the Union hall where an admirable concert was given, at which such notabilities in the vocal world as Mr. Ivor Foster, Mr. Warwick Evans, and Miss Margaret Balfour assisted. For those who preferred the sciences to music there was an instructive exhibition in the Fuel and Bessemer Laboratories, where such things as magnetic separation could be discussed, to the strains of Mr. Frank Reade's instrumental quartette. With so many imbued with holiday and dancing spirit, the study of magnetic attraction seemed to be more appropriate.

A highly enjoyable evening was brought to a close shortly after 11 p.m., when, as an instance of the thoroughness with which every detail was attended to, a number of motor vehicles were waiting to convey the guests to South Kensington Station.

Annual Dinner

This was a brilliant event, and took place at the Savoy Hotel on Wednesday evening last. Professor Henry Louis, M.A., D.Sc., occupied the chair; there were also present :—

Prof. Behal
Mr. D. Lloyd Howard
Mr. F. H. Briggs
Dr. S. Rideal
Dr. Herbert Levinstein
Mr. R. G. Perry
Dr. Charles A. Keane
Mr. W. B. M. Bird
Dr. C. C. Carpenter
Dr. Severini
Mr. Edmund Davis
Mon. Paul Kestner
Lt.-Col. Sir Arthur Churchman.
Sir Richard T. Glazebrook, F.R.S.
Dr. F. G. Cottrell
Sir William J. Pope, F.R.S.
Rt. Hon. Sir Alfred Mond, M.P.
Prof. C. Moureu
Sir James J. Dobbie, F.R.S.
Hon. R. C. Parsons, F.R.S.
Sir William A. Tilden, F.R.S.
Dr. R. Lucion
Mr. Emile Mond
Mr. H. K. Picard
Col. Sir Frederick L. Nathan
Mr. John Gray, President-elect of the Society
Sir Cameron Gull
Sir Herbert E. Morgan
Prof. H. E. Armstrong, F.R.S.
Dr. Charles L. Parsons
Mr. S. O. Nevile
Mr. Stanley Hicks
Prof. W. H. Perkin, F.R.S.
Dr. R. Messel, F.R.S.
Mr. J. Abady
Mr. H. P. Alger
Mr. J. Allen
Mr. M. Allen
Mr. E. A. Alliott
Mr. F. W. Atack
Mr. J. Baker
Mr. G. H. Bailey
Mr. E. G. Ballard
Mr. C. O. Bannister
Mr. M. Barrett
Mr. E. A. Bearder
Mr, K. Benham
Mr. J. Bernard
Mr. A. E. Berry
Mr, R. M. Bewick
Mr. J. W. Black
Mr. W. D. A. Bost
Mr. J. P. Bowley
Mr. H. Bridge
Mr. E. Hilton Brown
Mr. R. B. Brown
Mr. R. S. Brown
Mr. T. F. Burton
Mr. T. R. Burton
Mr. H. J. Bush
Dr. J. C. Cain
Dr. A. F. Campbell
Mr. A. J. Carden
Prof. Carmody
Mr. F. H. Carr
Mr. A. Chaston Chapman
Mr. A. J. Chapman
Mr. H. Cheetham
Mr. W. H. Coleman
Mr. R. T. Colgate
Mr. J. M. Collett
Mr. C. H. Cribb
Mr. H. S. Dains

Mr. E. K. Davis
Dr. F. B. Dehn
Mr. R. Demuth
Mr. J. T. Dunn
Mr. T. H. Durrans
Mr. F. C. Dyche-Teague
Dr. B. Dyer
Mr. F. Esling
Mr. E. V. Evans
Mr. P. M. Evans
Mr. R. P. Evans
Major Everington
Mr. J. Fairlie
Mr. F. T. Farrow
Mr. C. H. Field
Mr. S. S. Field
Mr. T. Fox
Dr. M. O. Forster
Dr. E. Fyleman
Mr. C. S. Garland
Mr. J. H. Garner
Mr. Gerard
Dr. J. N. Goldsmith
Capt. C. J. Goodwin
Mr. J. W. Gordon
Capt. G. Gray
Prof. T. Gray
Prof. A. G. Green
Mr. A. J. Greenaway
Mr. F. A. Greene
Mr. H. G. Greenwood
Sir R. Gregory
Dr. E. H. Griffiths
Mr. W. C. Hancock
Capt. C. V. Hardcastle
Mr. J. Hargreaves
Mr. E. P. Haslam
Mr. E. Hatschek
Capt. A. P. Hatton
Mr. G. H. Hedley
Col. C. T. Heycock
Mr. D. M. Henshaw
Dr. J. T. Hewitt
Mr. H. Hibbert
Mr. Edgar Hill
Prof. J. W. Hinchley
Mr. F. Hirsch
Prof. W. R. Hodgkinson
Mr. F. G. Holmes
Mr. D. A. Holt
Mr. E. Grant Hooper
Mr. E. F. Hooper
Mr. J. Huebner
Mr. A. F. Huggins
Mr. H. F. Hulton
Mr. J. H. Johnston
Mr. F. Jolliffe
Mr. G. C. Jones
Mr. M. W. Jones
Mr. L. A. Jordan
Mr. A. F. Joseph
Dr. H. A. D. Jowett
Mr. J. Kam
Mr. W. A. Kershaw
Mr. M. G. Kotsblasker
Mr. H. B. Lake
Mr. E. J. Lavino
Mr. W. J. Leonard
Dr. R. Lessing
Mr. A. R. Ling
Mr. A. J. Liversedge
Dr. J. P. Longstaff
Mr. A. H. Lymm
Mr. T. Macara
Mr. J. W. McBain
Mr. J. W. Macdonald
Mr. J. C. Mann
Mr. J. S. Mann
M. Marie
M. Marquis
Mr. H. C. Marris
Mr. R. J. Marx
Dr. Stephen Miall
Mr. F. H. Midwood
Mr. T. Miller-Jones
Mr. A. L. Mond
Mr. C. W. Moore
Dr. R. S. Morrell
Mr. H. N. Morris
Mr. E. F. Morris
Dr. W. R. Ormandy
Dr. L. T. O'Shea
Dr. A. Pansky
Mr. A. R. Pearson
Mr. D. Perry
Prof. J. C. Philip
Dr. R. H. Pickard
Mr. J. H. Pizey
Mr. B. D. Porritt
Mr. F. I. Pyman
Mr. H. E. F. Pracy
Mr. J. A. Reavell
Dr. A. Ree
Mr. W. J. Rees
Mr. A. F. Reid
Mr. W. F. Reid
Mr. E. P. Reilly
Mr. F. F. Renwick
Mr. C. Reynard
Mr. H. M. Ridge
Mr. W. Rintoul
Mr. J. G. Roberts
Sir R. Robertson
Mr. W. Murray Robinson
Sir T. K. Rose
Mr. J. D. M. Ross
Mr. H. Royal-Dawson
Dr. A. Rule
Mr. C. E. Sage
Mr. M. S. Salaman
Mr. A. H. Salway
Mr. E. H. Scholl
Mr. A. Searl
Dr. R. Seligman
Lieut. E. H. Shepherd
Mr. H. Dunford Smith
Mr. W. G. Smith
Mr. S. Solomon
Capt. E. J. Steadman
Mr. A. M. Steger
Mr. E. J. Sterne
Mr. S. Stewart
Mr. C. B. Stone
Mr. A. E. Symonds
Mr. F. Tainsh
Mr. H. Talbot
Mr. S. B. Tallantyre
Mr. F. H. Terleski
Mr. A. J. Thompson
Mr. E. Thompson
Prof. J. M. Thompson
Mr. W. Thomson
Dr. L. T. Thorne
M. Timmermans
Mr. P. R. Tingey
Dr. E. H. Tripp
Mr. A. Trobridge
Mr. T. Tucker
Mr. S. J. Tungay
M. Voisin
Mr. W. G. Wagner
Dr. E. W. Washburn
Mr. C. J. Waterfall
Mr. J. A. Weil
Mr. A. Whatmore
Mr. P. E. Wickham
Mr. W. J. Lloyd Willey
Mr. D. J. Williams
Mr. H. E. Williams
Lieut. F. G. Willson
Mr. Wm. Wood
Mr. S. W. Woolley
Prof. W. P. Wynne

In proposing the toast of "The King," the CHAIRMAN read a telegram from H.M. Private Secretary in reply to the message sent to his Majesty from the meeting. It was to this effect: "I am commanded to thank you for the dutiful message of congratulation you have addressed to the King on behalf of the members of the Society of Chemical Industry, on the conclusion of peace, and I am to assure you how fervently his Majesty reciprocates the hopes to which your message gives expression."

The CHAIRMAN also proposed the toast of the Kings of the Belgians and of Italy, the Presidents of the French and American Republics, and the Queen and Queen Alexandra, the Prince of Wales, and the Members of the Royal Family.

In proposing the toast of the Society of Chemical Industry, the Right Hon. Sir ALFRED MOND, First Commissioner of Works, remarked, by the way, that his father was one of the founders of the Society many years ago, and he himself for many years had the honour of being one of its members. It was a curious thing that it had required four and-a-half years of dreadful war to convince this country, and the Government, of the importance of the chemical industry to the world, and especially to the country in which we live. Since the war he was glad to think that there never was a time, perhaps when the Society of Chemical Industry had more reason to be glad and proud of its existence and of the work it had done for so many years. Since the war he was glad to think that the importance of the chemical industry had constantly been recognised, and the resources of this country had been recognised, but what the chemical industry had done during the war had been a very small thing compared with what had been done in the past. The progress of the world had rested, and always would rest, on the inventor All modern civilisation had been dependent on the scientific inventor. All modern civilisation depended upon those men who carried out their ideas. He had heard a good deal about capital and labour, but what about the elect and chosen men of all countries? Inventions and management were the two keynotes of industrial progress. "Research, new ideas, and enormous enthusiasm must be exercised to maintain industry." He coupled with the toast the name of Professor Louis, whose career and achievements were well known to them. The Government owed a great deal to him for the expeditions which he had undertaken in order to supply new sources of material of which we had been in sore need. National and allied science owed a great deal to him for the way in which he had combined tact, skill, and charm, at many important conferences, and brought about a bond of alliance which had tied them to those who had shed their blood in the interests of freedom.

The PRESIDENT, in returning thanks for the Society, said that they had about 5,000 members, and the total number interested in their Society was not far short of 7,000. The Society had proved itself in the strenuous days of the war. The problems of the Society were the problems of the industry in general. Problems which faced us on every side were problems of under-production. He was not afraid of high wages. There were high wages in the United States before the war, and yet no one would say that the United States was in a moribund condition. America worked to produce those high wages. He looked to the future with courage. We were passing through troublous times, and we had passed through troublous times before, but he thought the population of this country were blessed, as a whole, with sound common sense, and would rise to the occasion.

In proposing the toast of the "Delegates to the Inter-Allied Conference of Pure and Applied Chemistry," Sir WILLIAM POPE said that the occasion was unique, on account of the number of distinguished foreign guests they had with them. In connection with that movemen. a great deal of effort had been spent, not only here, but in France and America, too, to secure intimate co-operation between chemists. What they started in war they had to continue in peace. So much had been done by joint action during the past five years that much could be done by collaboration in peace at a very low cost.

"The Guests" was given by Mr. JOHN GRAY, president-elect of the Society, to which Sir JAMES DOBBIE and Mr. W. B. M. BIRD replied.

The Chemical Industry Club

By the Hon. Secretary

THE Chemical Industry Club has been the social centre of the Annual Meeting, and in addition to the President of the Society, leaders of British Chemical Industry and foreign delegates to the Inter-Allied Conference, such as M. Kestner, Dr. Cottrell, Professor Moureu and M. Poulenc,

Sarony, New Bond Street.

MR. H. EDWIN COLEY.

have made it their headquarters. The following details of the Club's work and programme may, therefore, be both appropriate and interesting.

British chemical industry has always lacked any organisation which tended regularly to supply those social facilities so well catered for in almost every other leading trade and profession. Club life is and has long been a feature of nearly all commercial organisations; but chemists and others interested in chemical industry have had to do without until quite recently. The Chemical Industry Club, whose premises are at No. 2, Whitehall Court, London, S.W.1 (just behind the War Office), is providing for British chemical industry the social facilities required.

The history of the Club is an interesting one. Many years ago there was, in connection with the Society of Chemical Industry, a dining club known as the Chemical Industry Club. The members were in the habit of meeting for dinner at some well-known restaurant just before the monthly meetings of the Society at Burlington House. With the outbreak of war the dinners were abandoned, and until the autumn of 1916 nothing was done to revive the idea in any form. Then a few members of the Society in London began to feel again the necessity for something of the kind, and some informal meetings of the Society were held at various places. These meetings were satisfactorily attended, and culminated in the formation of the Club as a branch of the Society of Chemical Industry.

The Club had no premises of its own then, and its members met once a month only at various places, to enjoy social evenings together. These meetings undoubtedly did much towards breaking down the barriers that existed between chemists and others connected with the commercial development of the trade. As time went on, however, the need for special premises became more and more apparent. Members wanted daily club facilities. An effort was made which resulted, after some months of search and negotiation, in the acquirement of the existing premises.

It was known at the time that some of the leading scientific societies had in mind a national scheme for combining in some way or other the facilities of all, and that that scheme was likely to include club premises. The present Chemical Industry Club was never designed to oppose such a national institution, but rather to provide accommodation in the interim with the intention of amalgamating at the proper time. The intentions of those actively engaged in the Club were at first misunderstood by some, but time has served to make it clear that the Club has the interests of the industry at heart, and has no other aim but that of promoting good feeling and understanding between those engaged in the industry.

Accordingly, in September, 1918, the Chemical Industry Club became very much an accomplished fact, and took possession of its comfortable and very central premises at Whitehall Court. We give illustrations of the principal rooms, including the dining room, smoking room and billiard room. It will be well, perhaps, while mentioning these illustrations, briefly to outline what the Club provides for the subscription the members are called upon to pay. There are three classes of members—town, country and foreign—who have to pay 3 gs., 2 gs. and 1 g. respectively each year. The qualification for membership is best explained by quoting the rule thereon, which states that "the object of the Club is to provide club facilities for gentlemen engaged or interested in chemistry or chemical industry." Recently some special arrangements have been made by which those normally eligible for membership, but who are still undemobilised, or who have just been demobilised, can become temporary honorary members. In this way it is hoped that the Club may be a means of enabling some of

Sarony, New Bond Street.

DRAWING ROOM.

Sarony, New Bond Street.

GENERAL DINING ROOM.

Sarony, New Bond Street.

A CORNER OF THE DINING ROOM.

these gentlemen to obtain positions. Others from overseas can become temporary members at reduced fees.

A valuable advantage has been added to the list of membership facilities by an arrangement with the Chemists' Club of New York. Under this scheme members of the Chemical Industry Club of London, when visiting New York, can become members of the Chemists' Club there without charge. Similarly, members of the Chemists' Club visiting London can enjoy the facilities of the English club while they are in this country. A number of American visitors have availed themselves of this scheme, which has tended to broaden the scope of the Club considerably.

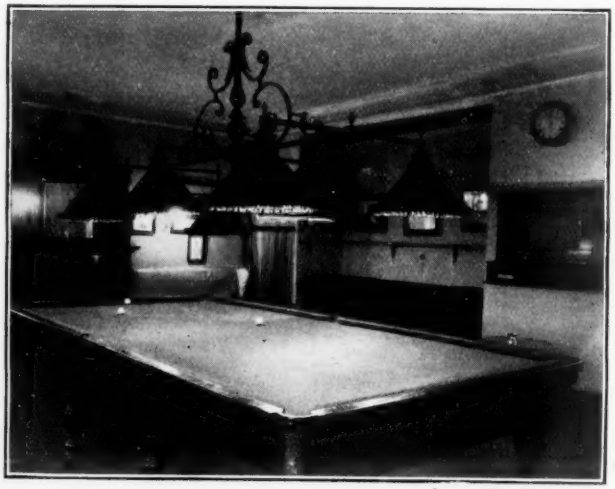
In addition to the club premises proper, the members have access to the public restaurant and drawing room, where they can take ladies. Bedroom accommodation can also be obtained. The Club is open all day, every day. Luncheons, teas and dinners are served at the normal hours. Technical and non-technical papers are supplied. In short, the Club is a club in every sense of the word.

The membership has steadily increased. The old Monthly Meeting Club had a membership of about 500. The subscription for this was only a nominal one, and naturally a good many members did not avail themselves of the new arrangement. It speaks volumes, therefore, for the increasing popularity of the Club that already, only ten months after its inception, the membership has reached a figure of over 600, and new members are steadily coming in. At one time it was thought that the club premises would not accommodate more than about this number, but what with country members and suburban members, it has been found that the average daily attendance at the Club is not so large that any inconvenience is caused, and many more can be accommodated. It is the desire of the Committee to have so large a membership that the need for a still more imposing club may be clearly demonstrated. British chemical industry is large and important. The scientific and technical societies have many members. All are welcomed and wanted. The reproach that those connected with chemistry are not sufficiently clubable to warrant the existence of a special club for them should not be allowed to exist a day longer than is necessary, especially now that the means are provided for refuting the charge.

The Club is run on simple lines. Every member has as much right and power in the Club as any other. There are no lists of heavy donations, and the officers and committee are elected annually. Any matter of general club importance is submitted to the members in meeting or by referendum. To put the Club on a solid basis a scheme of guarantors was

Sarony, New Bond Street.

SMOKING ROOM AND LOUNGE.



Sarony, New Bond Street.

BILLIARD ROOM.

inaugurated at the commencement, but no member was asked to guarantee more than £5. The Guarantee Fund at the present time amounts to well over £2,000.

The somewhat onerous work of carrying on the Club is undertaken by a committee and the usual officials. The names of these gentlemen are :—

Messrs. E. J. Aldrick; E. T. Brewis, F.I.C.; H. V. A. Briscoe, A.R.C.S., D.Sc., D.I.C.; Bernard F. Davis, F.I.C.; F. B. Dehn, Ph.D., M.Sc., A.I.C.; Prof. W. R. E. Hodgkinson; J. C. Johnson, A.C.G.I., A.I.C.; Richard B. Pilcher; J. A. Reavell, M.I.M.E.; H. M. Ridge; G. S. Walpole, D.Sc., F.I.C.; L. J. de Whalley, B.Sc.; E. C. B. Wilbraham. O.B.E., Ph.D., F.I.C. Mr. H. Edwin Coley is the Honorary Secretary; Captain C. J. Goodwin, A.M.Inst.C.E., B.Sc., the Honorary Treasurer; and Captain L. M. Nash, F.I.C., the Honorary Auditor. Sub-committees carry out the detailed work of the Club. One of the features of the Club's activities is the monthly meetings, which are quite informal, quite confidential, and very interesting. There is always a good re-union of members at these meetings.

It goes without saying that the present usefulness of the Club is well established, but it is equally evident that in future there are numerous activities which it can well adopt. The Chemists' Club of New York, an older and at present richer organisation, has many sections of work connected with it which the London Club may some day well copy: such as, an information and employment bureau, laboratories for hire, a library and a lecture room where technical societies can meet under the best possible conditions.

In France an organisation similar to the Chemical Industry Club has recently sprung up, under the name of the "Cercle de Chimie," and will no doubt play its part in cementing the "Entente Chimique." In this country local chemical or chemical industry clubs are meeting with considerable success, particularly where there is a local section of the Society of Chemical Industry. It seems, therefore, desirable that all these organisations, having so much in common, should keep in close touch with each other.

Among the present members of the Club are many whose names are well known in the chemical world, both on the technical and manufacturing sides. Most of the important societies, the large manufacturing concerns, and the Government departments are represented, and it is hoped that the example set by these gentlemen will be liberally followed by others in the near future. The second year of the Club's existence, which commences in September, should see the Club full, and playing a big part in the social side of chemical industry.

The International Potash Situation

This article has been specially prepared for The Chemical Age, *and deals with the following points:—Statistics and war-time expedients: pre-war and future cost of production from natural deposits and other sources: Natural deposits outside Germany: Potash from felspar leucites, &c.: Technical aspects and general conclusions.*

It is well known that the sale of potash throughout the world was, prior to the war, practically a German monopoly, the only natural soluble potash deposits of value being at Stassfurt, Germany, and in Alsace-Lorraine. The German Potash Syndicate sold in England at about £8 per ton of potash containing 80 per cent. of potassium chloride, while the actual cost of manufacture was probably about £6 per ton, although nothing quite definite is known regarding this. The German potash companies are apparently not very sound financially (*Chemical Trade Journal*, June 22, 1918, p. 488). The increased cost of labour, raw materials, taxation, &c., in Germany, coupled with an ever-increasing demand for potash, are adequate reasons for expecting a continuance of higher prices for a long time to come.

The outbreak of war resulted practically in a potash famine in every Allied country. As potash is indispensable as a fertiliser, is essential for certain munitions, optical glass and the chemical trades generally, and is also in demand for other industrial applications, strenuous efforts have been made during the last four years to produce any quantity, however small, of potash from raw materials, such as kelp (seaweed), blast furnace dust, molasses waste, wood ashes, suint, certain salt lakes, such as those in California, greensand, and the Chilian nitrate deposits, which contain small quantities of potassium nitrate. As the present price of potassium chloride is between £30 and £40 per ton, it is clear that the total output from such processes has been quite unable to meet the demand, and that the cost of manufacture is at present several times greater than the cost of German potash before the war.

The Market for Potash

The annual pre-war requirements of potash chloride in certain countries were, it is estimated, as follows, and the post-war requirements may be expected to be *much* greater:

United Kingdom	35,000 tons.
Italy	50,000 tons.
France	50,000 tons.
United States and Canada... ...	300,000 tons.
Germany	600,000 tons.

According to the official report for 1917 of the Chief Inspector for Alkali Works (p. 10), the total production of potash in the United States, naturally all from sources such as those indicated, was only 14,000 tons for the first six month of 1917, showing that a very long time must elapse before sufficient potash can be produced to meet pre-war requirements. It is well known that in a very few years the productivity of the soil, and therefore the supply of essential foods, will be most seriously affected unless the deficit in potash supplies in Allied and Neutral countries can be made up.

Statistics of German Potash

The figures available in this connection are often inaccurate and misleading, and care is necessary in studying them, as the prices given are not always on a comparable basis. The minimum estimate of cost of production in Germany before the war is usually given as £3 7s. 6d. per ton of 80 per cent. muriate. The *average* cost in Germany, however, was probably at least 50 per cent. higher than this, and is very largely dependent upon the condition of the market for the by-products obtained in working up the Stassfurt deposits. The average pre-war cost of German potash, f.o.b. a German port, is now usually accepted as being £6 10s. to £7 per ton of 80 per cent., and the price after the war is expected to be at least 50 per cent. greater. The amount of German potash available for export after the war will depend very largely upon the final peace terms and the German labour position. It is not to be expected that any Allied country will demand the handing over of large quantities of potash as part of an indemnity, because the total value of what is available is hardly large enough, and mainly because there would be little profit to any Government in handling or controlling the sales of such material, as, naturally, the consumer would demand that it should be distributed at a very low price. Recently, however, a certain amount of German potash has been exchanged for food. The chief use for the available German potash will, in the first instance, be for the devastated areas in Belgium and France, where the surface soil has been so ploughed up and mixed

with the subsoil that a fresh surface layer, properly fertilised with potash, would be necessary for the complete restoration of the districts in question to their original fertility. These requirements alone would, for a few years, absorb a very large proportion of the German potash output, and it is to be expected that they would have a certain priority over the requirements of other countries and districts.

Statistics and Cost of Production in Other Countries

The 1918 output in the United States reached 60,000 tons, as against about 300,000 tons, the annual requirements prior to the war. As regards potash from blast furnaces, it has been shown that the production of potash will depend very largely on the amount of potash available in the charge for the furnaces, and it is not yet established that the figures obtained in certain plants are at all applicable to other plants in which the potash content is much lower. If the product obtained from the dust precipitation is only 25 per cent. water soluble, it has been estimated that in America the potash would cost about £40 per ton, whereas with 40 per cent. water soluble the cost would be £25 per ton. It is only on the basis of a potash recovery of 85 per cent. that the cost of production would come down to about £11 per ton, and this does not include any overhead charges or royalty. The potash content of the iron ore is of great importance, and in America the quantity available seems only to be adequate in the State of Alabama.

As regards cement plants, very full information is available in the U.S. Department of Agriculture Bulletin, No. 572, but here again it is shown that economical potash production depends largely on the potash content of the materials used for making the cement, in addition to the cost of recovering the dust. The whole of the latter has to be charged to the cost of potash manufacture in the case of cement, as distinct from the problem with blast furnace gases, in which a part or the whole of the cost of cleaning can be debited to the enhanced value of the cleaned blast furnace gases.

In this country the position is much better, and it is probable that a part of our domestic requirements can be met by potash from blast furnace dust; this would not, however, have any influence on the international situation. Chance's work* in this connection is of great importance, the addition of salt to the blast furnace charge leading to a considerable increase in the amount of potash recovered. It has, however, still to be established that these additions are without effect on the daily output of pig iron, and an economically satisfactory system of dust recovery still requires to be evolved.

Turning to other possible sources in America, the total amount of potash available at Searles Lake is about 24,000,000 tons of potassium chloride, so that even if the whole of this could be utilised, the supply would be exhausted by the United States alone in less than 50 years. Apart from that, the profits to be derived from these workings will depend very largely upon the marketing and ready sale of the other by-products, and upon the cost of fuel. The quantity of evaporation to be done per ton of potash is evidenced by the fact that the boiler plant alone is of 12,500 horse power for a production of about 1,800 tons of 80 per cent. potash per month.

Natural Potash Deposits

As regards potash from kelp and seaweeds, it has been shown quite clearly that this industry can only live upon its by-products, such as iodine, etc., the mere cost of obtaining and drying kelp being £17 per ton of 100 per cent. K_2O. Prior to the closing down of these plants after the Armistice, the total output was only about 9,000 tons a year. As it is not likely that additional plants will be built, this source of potash cannot have any influence upon the general position.

* English Patent No. 112,338.

The most important deposits outside of Germany are at present those in Alsace-Lorraine, and have been fully described by Kestner.† Several of these mines are already producers, and are fully equal to those at Stassfurt. Their combined output is, however, only about one-fifth of the Stassfurt deposits, owing to the fact that the Germans deliberately restricted their exploitation in favour of their own mines. Development work will, no doubt, be actively proceeded with in the near future, but consideration of the enormous amount of capital sunk in the German deposits clearly indicates that many years must elapse before the Alsace fields become really large producers.

Rich deposits have also been discovered in the Italian colony of Erythrea (Abyssinia), and some hundreds of tons have been exported during the war. At first these deposits averaged about 95 per cent. potassium chloride, but later shipments were not so rich in potash, the analysis being as follows:—

KCl	75·26%	Mineral matter insoluble in water, oxide of iron, silica, &c.	4·42%
NaCl	6·54%		
MgCl	4·50%	Moisture, water of hydration	8·78%
$CaSL_4$	0·50%		

Apart from the question or freight charges, difficulties in regard to transport to the sea over 20 or 30 miles of difficult country have to be surmounted, and suitable arrangements made at the port of shipment. The extent and uniformity of these deposits remains to be established.

Similar deposits have been reported recently in Sicily and in Spain, the latter having been taken over by the Spanish Government. In all these cases, several years must elapse before the deposits are proved, or found economically workable.

Potash from Felspars, Leucites, &c.

Dr. F. H. Hatch has estimated that felspars constitute over 40 per cent. of the crust of the earth, and many of these felspars contain considerable quantities of potash. Some Cornish felspars contain as much as 12 to 14 per cent. K_2O, those at Eireboll, in Sutherlandshire, average 6 to 8 per cent. K_2O, while recently felspars in Ireland have been proved containing 8 per cent. K_2O, which can be increased to 12 per cent. by picking. Similar deposits are found in nearly all parts of the world, and in some mining districts, such as at Cripple Creek, millions of tons of "tailings" containing 8 to 10 per cent. K_2O are available.

In Italy enormous quantities of "leucite" are found, the potash content of which is estimated to be sufficient to meet the world's requirements for a thousand years. Leucite is a double silicate of potash and alumina containing when pure about 28 per cent. K_2O. As actually found, mixed with volcanic deposits, the content is, however, only about 8 to 10 per cent. K_2O. Attempts to separate the leucite crystals by the usual methods were quite ineffectual, the "gangue" having practically the same specific gravity as the leucite. Recently it was, however, discovered that the "gangue" was slightly electromagnetic and this would seem to have solved the problem of concentration, a recent analysis of the "dressed" leucite being as follows:—

SiO_2	=	57·7	CaO	=	0.11
Al_2O_3	=	23·7	Fe_2O_3	=	0.8
K_2O	=	15·5	Rest	=	0.09
Na_2O	=	2.1			

At one time it was freely stated that no process for the manufacture of potash from silicate rocks would be a commercial success unless the potash were merely a bye-product and the residue from the treatment of the felspar had a market value. The result was that most of the processes of this kind were considered less from their potash aspect than from the prospect of manufacturing and selling vast quantaties of materials having properties like Portland cement or capable of being made into silica or other varieties of brick.

† *Journal of the Society of Chemical Industry*, 1918, 291T.

It is now gradually becoming clear that in order to meet the potash requirements of any country, the quantities of bricks or cement that would have to be disposed of at the same time are so great that unless plants were put up in all parts of the country, the bricks or cement could not be disposed of at normal prices. The problem then became very similar to that met with in the ordinary cement works, and it will be evident that instead of putting down a large number of new plants to meet a doubtful demand, it is better to concentrate effort on existing cement works and to endeavour to improve their output of potash. Attention is now focussed on processes such as that of Ashcroft,‡ the object of which is solely the manufacture of potash, neglecting entirely the value of the residue. In this process, which is stated to be equally applicable to leucite and other potash bearing rocks, the chloride is obtained in relatively pure form by the double decomposition of the silicate with salt according to the general equation:

$$K_2O[Al_2O_3(SiO_2)_6]+2NaCl=Na_2O[Al_2O_3(SiO_2)_6]+2KCl$$

The reaction is a reversible one, but under special conditions, viz., the substantial absence of air and moisture, and with due regard to the principles of "mass action," yields of up to 85 per cent. are stated to be obtainable. The patent is well worth study as an example of careful investigation, and the process should prove of great value if, as has been claimed, potash chloride can be manufactured on a large scale at less than the pre-war cost of German potash, and in plant requiring only a small capital outlay compared to its output. It would seem urgently desirable that this and all other processes having reasonable prospects of commercial application should be thoroughly investigated under Government auspices, and that concurrently, the potash resources of the Empire should be thoroughly surveyed. In the latter connection the Alunite deposits of Australia§ are of particular interest, though it is unlikely that they will be of value for export.

Technical Aspects

With the possible exception of potash from cement works and blast furnaces, nearly all processes for potash manufacture seem to involve the evaporation of very large quantities of solutions and a very large amount of plant. As regards cement works, the dust is so fine and the potash fume so difficult to precipitate that very low velocities and therefore very large precipitation plants are required. In the case of blast furnaces, the dust is contaminated with very many impurities, which though not of very great importance when used for fertilisers, nevertheless require great technical skill, and expenditure as regards plant and processes in order to purify them sufficiently for manufacture of caustic potash and other pure potash products. In Great Britain the Cottrell process has not been introduced to any extent, and the Halberg-Beth type of cleaning plant, consisting of filter bags, is at present preferred. The evidence as to cost of cleaning the gases is very conflicting, and as the usual estimate of cost is over 50 per cent. of the pre-war value of the potash recovered, the point is of great importance, particularly in the case of cement plants where it is not possible to make any allowance for increased value of the exit gases on account of their being cleaned.

General Conclusions

It seems clear that for many years to come the world's requirements of potash will be far greater than can be met by the German potash production on the pre-war basis, and even the amounts of potash produced from other sources during the war are quite insufficient to make up the deficiency. As a result, it is evident that potash prices will remain high for many years to come and £15 to £25 per ton may be assumed as the lower and upper limits. It is probable that many of the processes that have been developed since the war will be able to exist for some time to come through improved methods of working and through the profits obtainable from the sale of by-products obtained in potash manufacture. It is, however, evident that there is ample room for further new processes and developments which will be able to live side by side with existing processes and sources. To make up the world's requirements, it is very unlikely that potash from blast furnaces and cement works will be sufficient to meet the deficiency, partly because of the reluctance of these works to instal additional plant, partly because the potash content of the raw materials used is in most cases insufficient to justify the additional capital expenditure, and partly because in all these cases the factories are not dependent for their profits upon the manufacture of potash, which is only a by-product and a small item compared with the cost of manufacture of pig-iron and cement respectively. The question of royalties will also play a considerable part, while in the case of blast furnaces the additional cleaning of the gases will probably only be justified in cases where they are used for working gas engines. In any case, potash production in such plants will not effect a reduction in the market price of potash because, as a general rule, these plants will not work up their own potash dust, but will deliver it to some central potash factory that would have to buy the dust from them. That being so, it is only natural that blast furnace and cement works will endeavour to obtain the maximum possible price for their dust, which will simply be regulated by the current market price of potash. The total world's production being insufficient to meet the demand, there will be no incentive to reduce the price.

The production of potash from silicate rocks (and perhaps also from alunite) is a different matter, especially in the former case, because such plants are intended solely for the manufacture of potash. They can be erected in almost any part of the world, in places most convenient and close to agricultural districts. They will thus have the advantage of saving in freight, &c., while they will also be in localities where there is no difficulty in disposing of the waste residue. Such freedom as to the site for the works is not obtainable in the case of blast furnaces, cement works, &c., and owing to the shortage of shipping and other means of transport after the war, this may prove to be a very important factor.

No reference has been made in this digest to sources of potash such as wood ashes, molasses waste, &c., as these, although interesting in the technical sense, have only a small bearing on the whole question.

‡ English Patent No. 113,211.

§ Advisory Council of Science and Industry, Melbourne, Bulletin No. 3.

Phosphate Fertilisers in South Africa

We learn from a correspondent of the *Times Trade Supplement* that the manufacture of phosphate fertilisers has been started in South Africa. On a site of five acres at the old Ferreira mine on the Rand a factory has been erected by the Salphos Fertiliser Company for the production of a basic phosphate manure. Crushing and grinding machinery and appliances on the spot have been adapted to the requirements of the factory. The existing plant has a capacity of 2,500 to 3,000 tons per month of the finished product, and it is estimated that it would, with slight modification, be able to produce up to 50,000 tons a year. The raw material used is the phosphatic rock of Saldanha Bay. After treatment by a new process, devised by Mr. Tromp, of the University College in Pretoria, after careful research, a fertiliser is prepared containing 14 per cent. of citric-soluble phosphoric oxide. The fertiliser is manufactured to conform to Government requirements, and it is claimed that all its constituents are beneficial to the soil, and that it will be especially valuable for application to the sour soil often met with in the southern wheat-growing districts.

Chemical Matters in Parliament

Linseed Oil (Deliveries to Germany)

In reply to Captain Brown, who asked on what date the agreement to supply Germany with 25,000 tons of linseed oil at £78 per ton, was made; if this amount had now been delivered; and if any further agreements to supply linseed oil to Germany had been made

Mr. Roberts said that approximately 12,000 tons of linseed oil had been delivered to Germany under the agreement of March 31, 1919. No further agreements to supply linseed oil to Germany have been made.

Liquid Petroleum in Norfolk

Replying to Sir J. D. Rees, who asked the President of the Board of Trade whether he could give the House any information regarding the discovery of oil in Norfolk, Mr. Kellaway (the Deputy-Minister of Munitions) said: I have been asked to answer this question. I have no information regarding the discovery in Norfolk of liquid petroleum. It has been known for a long time that the Kimmeridge Shales of Norfolk would yield considerable quantities of oil on distillation. The utility of this oil for commercial purposes depends, however, on the extent to which it might prove possible to eliminate the very high percentage of sulphur which it contains.

Sir A. Fell: Does the Government propose to do anything to develop these?

Mr. Kellaway: We are doing everything possible to develop every possible source of oil in this country.

British Oilfields

Mr. Holmes asked the Parliamentary Secretary to the Ministry of Munitions if he were in a position to give the names of those who will constitute the Committee which is to report upon the policy, and the means of carrying it out, concerning the discovery of oil in Derbyshire; what the terms of reference will be; and whether the Committee will be asked to report before the Summer Recess?

Mr. Kellaway: I would refer my hon. Friend to the answer which I gave him on Tuesday.

British Cellulose Company

In reply to Lieut.-Colonel W. Thorne, who asked what was the total capital outlay of the British Cellulose Company on August 1, 1918; how much of this had been provided by the State, either in rebate or Excess Profits Duty or in any other form, and what were the total liabilities of the State in respect to this outlay; whether any further capital outlay had taken place since August 1, 1918; and, if so, did any liability rest upon the State to recoup the whole or part of any such outlay; Mr. Mellaway said that until the Committee appointed by the Government had reported he did not think it desirable to make any statement.

British Patents

Mr. Bridgeman, in reply to Sir J. Norton Griffiths, who asked the President of the Board of trade what arrangements are being made to safeguard British patentees in respect of patents taken out before the War in countries which will be sub-divided in consequence of the terms of Peace; and in what way will licences, granted by patentees to manufacture goods which could only be supplied in certain countries, be affected, having regard to the fact that such countries no longer exist in the form in which they did when the licence was granted, said: As regards the first part of the question, I would direct the hon. and gallant Member's attention to Article 311 of the Treaty of Peace with Germany. The provisions of the Treaty with regard to licences granted before the War will be found in Article 310. Similar provisions will be embodied in the Treaties to be concluded with the other enemy Powers.

In reply to Mr. Rowlands, Mr. Bridgeman said he hoped that the Bill to amend the Patents and Trade Marks Act would be introduced this week.

The following particulars are published of the stocks (exclusive of old metal and scrap) in this country in possession of the Minister of Munitions on July 1:—Copper, 44,298 tons; spelter, G.O.B., 26,059 tons; spelter, refined, 13,356 tons; aluminium, 10,662 tons; soft pig-lead, 121,135 tons; nickel, 2,452 tons; antimony, regulus, 4,368 tons.

British Inventors' Grievances

Demand for Reform of Patent Law

A meeting was held at Cannon Street Hotel, London, on Thursday July 10 to consider the question of forming an institute with the above or a similar title.

Sir Joseph Lawrence, who presided, said there had long been a necessity for some combination between inventors and owners of patents in this country. He referred to the co-operation with Mr. Ivan Levinstein, which began some twenty or thirty years ago, and which had for its object the reform of the patent laws and particularly to secure that foreign patentees should work their patents in this country, and so bring new industries into the country and employ British labour. The immediate object of the present movement was to ask the Government to give an extension of time to those patents which had been held up during the war. He did not know of any other body that represented so much labour and capital as the owners of patents in this country, and yet they were without an organisation of patentees.

Amongst the other objects of the proposed institute was one which they asked for twenty years ago, viz., the reduction of cost of patents. It cost a man £100 during the fourteen years of his patent here, whereas in America it cost £7 5s. 10d. The report of the British Patent Office showed that the receipts from patents in 1917 were £292,000 and expenses £124,000, leaving a balance carried to the Treasury of about £170,000. A State department like the Patent Office ought not to make a profit out of the struggling brains of inventors, and the fees could be comfortably reduced by 50 per cent. if not abolished.

Mr. Harry Foster (in the absence of Sir Herbert Neild, M.P.) moved the following resolution:—

"That this meeting approves the formation of an organisation to safeguard and promote the interests of patentees, and pledges itself to united action in the duty of using all legitimate means to obtain from Parliament an extension of the life of patents which have been prevented from working and developing in consequence of the war, and expresses its opinion that an alteration in the law is desirable in the interests of manufacturers, and for the purposes of reconstruction."

Mr. Walter F. Reid (President of the Institute of Inventors), in supporting the resolution, said that the objects of the Institute of Inventors, which had existed more than six years, were similar to those of the proposed new Association, and it moved in the matter of the prolongation of patents some time ago. A conference was convened at which twenty-six of the chief technical institutions were represented. A deputation went to the Board of Trade and, as a consequence, he thought, all that was objectionable in the Government Bill was withdrawn. But that was only a negative advantage. They wanted to induce the Government to rectify the injustice done to patentees by preventing them from working their patents during the war while making them pay fees to keep the patents alive. Our best inventors went to America, where they were received with open arms, because our Government picked their pockets. They gave one a licence for litigation and asked a hundred pounds for it.

Mr. Morgan Morgan seconded the resolution which was carried with one dissentient.

Mr. G. Tirrell, M.P., proposed and Mr. Arthur Barclay seconded a resolution which was ultimately passed in the following form:—

"That a deputation be organised by the Association to wait upon the President of the Board of Trade for the purpose of presenting to him the foregoing resolution."

South African Glass Sands

According to Dr. P. A. Wagner, of the South African Mineral Survey, enough is known to warrant the assertion that there are in the Union vast resources of sand suitable for the manufacture of all but the very finest grades of glass ware. So far only the deposit near Pienaarspoort in the Magaliesberg, from which the Hatherley glass factory obtains its supplies, has been successfully employed on a large scale for making glass. This deposit is situated close to the Pretoria-Delagoa Bay Railway Boreholes have proved the sand deposit to be 90 ft. in thickness. The suitability of this sand in its natural condition for bottle-making has been amply demonstrated.

Chemistry in Modern Industry

Midland Manufacturer's Strong Advocacy

An interesting address on the ever-increasing importance of the industrial chemist in British manufacturing operations was given on Monday, by Mr. Wilfrid Hill, a leading Birmingham manufacturer, before the members of the National Union of Manufacturers, at a representative meeting held at the rooms of the Birmingham Chamber of Commerce.

Mr. Hill (who is Chairman of the County Chemical Company and the Calthorpe Motor Company) has recently paid a visit to the Rhine provinces, and his remarks consisted of "commercial reflections" on that visit. What impressed him, as a chemist and a manufacturer, more than anything else was the great aniline dye-works at Leverkusen, in which one saw, possibly, the world's greatest triumph in the application of chemical science to industry. In little more than a generation science had made Germany one of the most progressive industrial nations of the world. "The prosperity of German industry," said Mr. James Stephenson, "was in a large measure due to her wonderful educational system which aimed at the application of scientific results to industrial development." Germany made science the handmaid of commerce, and her incomparable aniline dye works were one of the remarkable results which served as an illustration of her wonderful success in commercially exploiting a scientific discovery.

"I am convinced," he said, "that there are very few British factories, of any considerable magnitude and importance, in which the installation of a well-equipped laboratory and the employment of a competent chemist would not be a sound and profitable investment." (Hear, hear.) The manufacturers' chemist would carefully inspect and analyse raw materials on their arrival, and so ensure that only ingredients of good quality entered into the composition of the finished article. This detective process would prevent three undesirable things:—(*a*) fraud on the part of those who supplied the materials; (*b*) disappointment and complaint on the part of the manufacturer's customers; and (*c*) loss of reputation and trade to the manufacturer himself. It would also be the duty of the chemist employed to revise the formulæ used by the firm in the light of the latest scientific discoveries, thus from time to time improving the quality and lowering the cost of the goods produced. Furthermore, it would be his province to test the finished products before dispatch to make sure that neither accidental mistake nor deliberate neglect in the process of manufacture had led to the production of goods either above or below the standard of quality intended. Lastly, the chemist from his daily experience, and as a result of his personal experiments, would be able to suggest new lines, and so stimulate the firm's enterprise and expand its business." "I am no mere theorist," added Mr. Hill, "and when I advocate the application of science to British industry, I want, as a practical man, to show how it can be done."

Mr. Hills' second reflection was that in the aniline dye works we had an illustration of Germany's genius for hard work. Science was not a substitute for genius. Those works were, while being a monument to Germany's commercial genius, the greatest reproach to Britain's short-sightedness. Science alone could not have made Germany a progressive and prosperous manufacturing people Germany's prosperity was due to the fact that she was alike industrious and scientific. To-day commerce needed not only more science, but more deligence—a greater enthusiasm for productive work.

One effect of the war—let us hope it was only temporary—seemed to be a sense of exhaustion and the creation of an almost universal disinclination for ordinary routine work. That spirit was very manifest in many British factories where there was a noticeable reluctance to put forth the best physical energy on the part of the work people. What was wanted in England to-day was a new basis of relationship between capital and labour; there must be a means whereby employer and employed may meet, reason, understand and co-operate with one another. Modern industry must be democratised by the setting up of works committees and joint industrial councils. Real improvement in the standard of life could not be brought about by clamouring for shorter hours and higher pay; it could only be done by increased output; and, as a new basis of remuneration, something was necessary beyond the weekly wage and the piece-work rate—an attractive bonus on output.

Finally, the claims of science, of industrial chemistry and engineering, could scarcely be over-emphasised. Thirty years ago someone slumbered and blundered. Who was responsible for the loss of our nation's trade? Was it the British manufacturer of dyes or the British Government of that day? He was disposed to saddle both with the blame and the shame. Had the native dye industry been better organised, had there been closer co-operation between the makers and users of dyes in the textile and allied trades, and had those British producers and consumers been gifted with more foresight, the trade, necessity for which there was bound to be a ready market in almost every market of the world would never have been allowed, to become the monopoly of an actual rival and a potential foe. (Applause.)

"If we wish to emulate Germany's commercial success," concluded Mr. Hill, "we must imitate her commercial virtues· British commerce must become more scientific, more enthusiastic, and more heroic."

The Association of British Chemical Manufacturers

The third annual meeting of the Association was held in the Council room of the Chemical Society at Burlington House, on Thursday, July 10.

The Chairman, Mr. Robert Grosvenor Perry, C.B.E., reported a membership of 145 firms, representing a capital of about £70,000,000. In addition seven kindred associations were affiliated to the Association. During the year much useful work has been accomplished in consolidating the industry and strengthening the position of its various branches. The Chairman pointed out that we are only on the threshold of a great dye industry in this country, and the Council of the Association had paid close attention to this question. The Association has been recognised by the Board of Trade, and Dr. A. Ree and the general manager, Mr. Woolcock, M.P., have acted as members of the Trade and Licensing Committee. In addition, Lord Moulton, the Honorary President of the Association, has accepted the Chairmanship of British Dyestuffs Corporation.

The importance of the manufacture of fine chemicals as a key industry has also been impressed on the Government, and the Association has been represented on an Imports and Exports Consultative Council which was set up as a temporary measure. Close attention has been given by the Association to Parliamentary legislation in so far as it affects Chemical Industry, and particular mention may be made of Patent Law and Traffic problems. A strong commission of the Association, representative of all branches of the Industry, has recently returned from, and reported comprehensively upon, their visit, under Government auspices, to the chemical factories in the occupied area of Germany.

It is interesting to note that during the year an *entente cordiale* has been established between the British and French chemical industries, and collaboration between the two should be to their mutual advantage. After touching on many matters of domestic interest, the Chairman stated that he was called upon to give evidence before the recent Coal Commission and to give his views on the control of productive operations by Public Departments.

In the discussion which followed appreciation was expressed at the work done by the Council, and it is evident that the Chemical Industry has derived great benefit from the activities of the Association since its formation in 1916.

In the evening a representative gathering dined at Princes' Hotel. The toast to H.M. Ministers was proposed by Lord Moulton, and responded to by Sir Alfred Mond. Lord Moulton expressed his terror in the early days of the war at the lack of important chemical industries vitally necessary to save this country from defeat, and wondered to what extent the nation realised the importance of this industry.

In proposing the toast to the Association, Mr. F. G. Kellaway, M.P., enlarged upon the remarkable achievements of British chemists, and the wonderful part played by the industry as a whole. The toast was suitably responded to by Mr. Max Muspratt.

Dr. C. Carpenter, vice-president of the Association, proposed the toast to "Our Guests," which was responded to by the Earl of Dunmore, V.C., D.S.O., and General Sir Wm. Birdwood, K.C.B., K.C.S.I. The toast to the Chairman was proposed by Sir William Pearce, M.P., and briefly responded to.

Work of the Insurance Commissioners and the Royal Societies

In a highly interesting report just issued by the National Health Insurance Commission it is stated that the sudden and unexpected outbreak of war created a critical position in regard to the supply of drugs in this country. For years the United Kngdom had been in some respects wholly, in other respects partly, dependent upon Germany for a large number of medicinal chemicals, and for some medicinal herbs, and the sudden cessation of these supplies caused by the war gave rise to grave apprehension that a serious shortage would be experienced in certain products that are essential for the adequate treatment of disease. Before the war the United Kingdom was very far from being self-supporting in the production of drugs; the country was dependent upon overseas supplies for a very large number not only of raw materials but also of manufactured products.

The raw materials were of two kinds :—

(1) Simple inorganic substances, such as bromine, iodine, bismuth, mercury and potash, to which may be added mineral oil; and

(2) Vegetable products, such as cinchona bark, ipecacuanha root, coca leaves, opium, etc.

Some of the inorganic substances are not found in this country, and many of the vegetable products used as drugs are obtained from plants which require for their growth climatic conditions that do not obtain in the United Kingdom. The outbreak of war, therefore, found the British drug industry largely dependent on raw material from overseas. The raw materials required for the drug industry are, with few exceptions, normally derived not from enemy countries, but from the overseas Dominions or from neutral countries, and provided that the sea routes could be maintained there was no reason to apprehend shortage. It was not until a comparatively late stage in the war, when enemy submarine activity had seriously reduced the shipping available for overseas transport, that it became necessary for the Government to take special steps to secure a continuance of adequate supplies of exotic raw material for medicines.

One important raw material, however, was produced in enormous quantities in the United Kingdom, namely, coal tar, but little use was made of it by the British drug manufacturers. Large quantities were exported, and in Germany it was used for the manufacture of certain highly important synthetic medicines in which Germany, before the war, had practically a monopoly. Among these coal tar and allied products were the local anæsthetics, novocain and eucaine; the antipyretics, phenacetin, phenazone; and the salicylate group (namely, salicylic acid, sodium salicylate, aspirin, salol, methyl salicylate, etc.; the intestinal antiseptics, beta-naphthol and benzo-naphthol; and the supremely important anti-syphilitic remedies salvarsan and neo-salvarsan.

Apart from the coal tar products there were other important drugs for which the world was practically dependent upon Germany, *e.g.* medicinal liquid paraffin, which was made from Russian petroleum, thymol, made from Indian Ajowan seed, potassium permanganate, and purified wool fat (lanolin). Atropine also, though made on a small scale in other countries, was chiefly obtained from Germany, where it was extracted from hyoscyamus muticus imported from Egypt and the Soudan. It is possible, however, to exaggerate the importance of the German pre-war production of medicinal chemicals, as is sometimes done to the detriment of the British chemical industry. For years before the war British manufacturers held their own in the production both for home use and for export of many highly important drugs, such as the salts of bismuth and mercury, the anæsthetics chloroform and ether, and the alkaloids morphia, codeia, strychnine and emetine. In the production of these and similar products British firms before the war competed successfully with their German rivals.

Medicinal Herbs

In addition to these manufactured products there are certain medicinal herbs, *e.g.* belladonna, henbane and stramonium, the chief sources of which before the war were Germany and Austria. Although these herbs grow in this country, large quantities were imported as raw material for the British makers of medicinal preparations and sold at prices with which the home cultivators and collectors could not compete. These herbs grow wild in the southern parts of central Europe, where an organised system of collection by a large number of small collectors enabled vast quantities to be exported at a low price, with which British producers were unable to compete. A few days after the outbreak of war, representatives of the leading wholesale drug houses were interviewed at the offices of the Pharmaceutical Society, and information was obtained which made it possible at once to draw up a list of the drugs likely to be scarce and expensive. This list was checked and verified on the following day as the result of interviews with practically all the principal importers of drugs in London. A recommendation was made to the Home Office suggesting the appointment of a professional committee to advise the medical profession on the matter. A strong committee of medical men was appointed by the Home Secretary, with the Deputy Chairman of the Insurance Commission as Chairman, and the committee immediately issued a circular to every doctor in the United Kingdom indicating the drugs that were in short supply, and making suggestions as to the most economical uses to which the limited stocks could be put. A further step was taken by the appointment of a committee consisting of representatives of the wholesale and retail drug trade to furnish advice in regard to the current prices of drugs, with particular reference to cases of artificial inflation as the result of speculative transactions or withholding of stocks.

The Royal Society's Assistance

It was at an early stage realised that to obtain the best results it would be necessary to bring manufacturers into close relation with the leaders of British scientific chemistry. Shortly after the outbreak of war the Royal Society offered the Government assistance in conducting or suggesting scientific investigation in relation to the war; the offer was at once taken up and arrangements were made for the assistance of *bona fide* manufacturers, recommended by the department, who had experienced difficulties in the manufacture of drugs and fine chemicals hitherto obtained only from enemy countries. In the case of firms so recommended the Royal Society undertook, under certain defined conditions, to make arrangements with a suitable scientific institution, or a responsible member of such institution, to carry out the desired investigation, and, usually, to place the firm desiring assistance in direct touch with the institution selected for the purpose. A circular was issued to a large number of firms informing them of the offer of the Roval Society, and asking for particulars of special work undertaken by manufacturers since the outbreak of the war, and of any demand for drugs or fine chemicals experienced by manufacturers or wholesale druggists which it had been found impracticable to meet. In some cases it appeared that the difficulties experienced were such as could more

appropriately be dealt with not under the scheme but by reference to a competent chemist within easy reach of the applicant, and the applicants were so informed; but where there was a real need for the special assistance contemplated the best information available was given, or, where necessary, the difficulties were referred for investigation to various scientific institutions, who were put into communication with the firm applying for assistance. The investigations made in this connection resulted in the working out of chemical processes of considerable scientific and commercial importance. In particular, new methods were elaborated for the production of phenacetin and of guaiacol, and of a special form of decolourising carbon which is needed for the manufacture of certain important fine chemicals. One of the most important results was the collection of a large body of original information of great value on the subject of methylating and ethylating agents. This information was placed at the disposal of about fifty firms who, at the invitation of the Department, stated that they wished to make use of it.

In the case of certain drugs the Department was able, through the action of the Royal Society, to secure supplies which would otherwise have been quite unobtainable. Novocain is an example. This most important local anæsthetic is a synthetic chemical of German origin, which is built up by a number of chemical processes of great complexity and technical difficulty. The drug was required by the medical departments of the Navy and Army, and also by the Allied Governments, and it was necessary to obtain fresh supplies. The Department therefore solicited the aid of the Royal Society with a view to the manufacture of the intermediate products of novocain in scientific institutions, and the Royal Society appointed a small sub-committee to organise the necessary work. The committee formulated directions for preparing the constituents of novocain and proceeded to enlist the assistance of about forty University and college laboratories throughout the country, and issued suggested processes for the production of diethylamine on the one hand and glycol-chlorhydrin on the other. These substances were then converted into diethylamino-ethanol, the final synthesis into novocain being undertaken by a manufacturing firm.

The Importance of Novocain

In this way over 350 lbs of novocain (representing over seven million ordinary doses) were produced. In addition supplies were made to about fifty public hospitals in the United Kingdom, and a considerable quantity was released to meet a special demand for dental use. The importance of securing that novocain should be made freely available through the ordinary commercial channels was not lost sight of, and in the winter of 1916-17 three firms had begun to make the drug, largely, at the outset, with ethanol supplied by the Department. At the present time the world's requirements for novocain could readily be met by British manufacturers.

Beta-eucaine is another important local anæsthetic which before the war was obtainable only from Germany. Arrangements were made with the Royal Society for the production of this substance in various scientific institutions, about seventeen laboratories co-operating in the work. Over 216 lbs. (representing over three million doses) were made in this way. For the purpose of the work the ordinary methods of making beta-eucaine were improved in various respects, and the improved processes were communicated, on the recommendation of the Department, to six firms that proposed to make the drug on a commercial scale. As a result, beta-eucaine of British manufacture is now freely available.

In 1916 urgent requests were received from the War Office for supplies of three other carbo-hydrates, levulose, inulin and arabinose, which were required for bacteriological purposes, and arrangements were made with the Royal Society for the collection of the necessary raw materials and for the production of these articles in scientific institutions. In all, 8 lbs. 13 ozs. of levulose, 8 lbs. 15 ozs. of inulin, and 29 ozs. of arabinose were made in this way. Some difficulty was experienced in obtaining the necessary raw material for the manufacture of the articles; the arabinose was made from such various substances as cherry gum, gum arabic and beetroot shavings, and several tons of dahlia tubers were used in making the levulose and inulin. Early in 1916 attention was drawn in the medical Press to the antiseptic properties of the dyes, brilliant green and methylene blue, and the department at once arranged with the Royal Society for an investigation to be conducted into the methods of producing these substances in the form suitable for the treatment of wounds. The investigation was brought to a successful conclusion, and it was possible to make supplies to the War Office. At the suggestion of the Department the production of these antiseptics was then successfully undertaken by a manufacturing firm.

Saccharin

One of the difficulties experienced by manufacturers arose from the fact that some of the most important of the raw materials they required, *e.g.* carbolic acid, toluol, benzol, chlorine, acetone, etc., were in urgent demand for munitions purposes and were necessarily subject to stringent control. The Department was in close touch with the Ministry of Munitions on the matter and undertook the responsibility of advising the Ministry upon all applications for the release of such material required for medicinal purposes.

Some mention may be made of Dr. Shaw's work in regard to the production of saccharin. In 1917 the Ministry of Food took steps to encourage the production of saccharin as a sugar substitute for certain purposes, and entered into arrangements with a number of firms who were able to satisfy the Ministry, in conference with the Department, that they were capable of producing saccharin. The Ministry of Munitions then released, on the recommendation of the Department, the quantities of toluol required by the firms for the manufacture of saccharin, on the understanding that the Department became responsible for securing that the most economical use was made of the toluol. In accordance with this arrangement the firms were kept under close supervision by Dr. Shaw, who was able in various directions to advise as to the most economical methods of production, and in this way to secure a larger ouput than would otherwise have been possible.

In the last year of the war it became necessary to make special arrangements with the Ministry of Food to secure supplies for medicinal use of some food stuffs, *e.g.* olive oil, nut oils, certain dried fruits, etc., which are required by wholesale druggists for the manufacture of medicinal preparations. The Ministry, on the representation of the Department, readily made special allocations of these articles, which were required only in small quantities; and the distribution amongst the various firms was arranged through the Honorary Secretary of the Drug Club, Mr. T. E. Lescher.

In conclusion it may be noted that the following are some of the medicinal chemicals, in which Germany had practically a monopoly, that are now produced commercially in the United Kingdom:—

Acetyl-salicylic acid.	Phenacetin.
Salicylic acid.	Novocain.
Sodium salicylate.	Eucaine.
Methyl salicylate.	Salvarsan.
Salol.	Neo-Salvarsan.
Medicinal liquid paraffin.	Paraldehyde.
Potassium permanganate.	Resorcin.
Thymol.	Lanolin.

Reviews

CORK: ITS TRADE AND COMMERCE. Published by the Cork Incorporated Chamber of Commerce and Shipping (First issue).

THIS volume is frankly issued in the interests of the trade and commerce of Cork and district, and is edited by D. J. Coakley, principal of the Municipal School of Commerce. Intended to show in a concise form the commercial and industrial facilities of the city and the surrounding district, it gives an interesting sketch of its fluctuating fortunes, together with notes on its present commercial position. Considerable space is given to the chemical industries of the city. The first of these is the manufacture of fertilisers, which has become an important industry, largely owing to Goulding's works. On this subject it is stated:—

Bones, bruised or broken, were probably the first artificial manure used; but about the beginning of the nineteenth century it was found that fineness of division rendered bones more easily assimilated by plants. This fine division was chemically attained when Liebig introduced the treatment of ground bones with sulphuric acid. Large quantities of bones collected throughout Ireland, after having their valuable grease extracted, are ground and dissolved by sulphuric acid, and sold as bone manures. But the supply of bones falls far short of the requirements of modern agriculture; and the enormous deposits of tribasic phosphate of lime in the United States and Northern Africa, though of little value as manure in their natural state, are converted into superphosphate by the action of sulphuric acid, whereby the tricalcic phosphate, which is insoluble, is converted into mono-calcic phosphate, which is soluble, and, therefore, readily available to plants. Upon this conversion from the insoluble form to a soluble state has been built up this chemical industry, which in these works transforms the raw phosphates into upwards of 40,000 tons of available plant food per annum. The demand for these fertilisers in Ireland has grown rapidly within the last few years largely owing to the work of the Department of Agriculture and technical instruction in instituting, through the County Councils, a series of experimental plots throughout Ireland, showing the beneficial results obtainable by their use, in increasing the yield to a value far in excess of the actual cost of the fertilisers employed. The basis of the business—the manufacture of sulphuric acid—is carried on on a large scale, about 500 tons of sulphuric acid being produced weekly. The acid is produced from pyrites imported from Spain, the residue, after burning off the sulphur, being re-shipped to England, where the copper contained in the cinders is extracted. The phosphate of lime, which arrives from Africa and America in cargoes of 4,000 tons or upwards, is ground in specially constructed mills to an impalpable powder before being treated and dissolved by the action of sulphuric acid. The resulting mass, after maturing, is withdrawn from the dissolving-pits and pulverised to a fine powder, either for application to the land by itself, or in conjunction with nitrogen compounds and potash, which are mixed with the superphosphates by the manufacturers in the proportions which experiment and experience have proved to be most efficacious for the different crops for which they are intended. Goulding's manures are well known to farmers in England, Scotland, and abroad. A considerable quantity is exported every year, principally to the West of England, but by far the greater portion is reserved for the wants of the farmers in Munster and the South-West, who practically depend on this source of supply, this being the only factory of the kind in the Province of Munster.

Mention is also made of the production of carbonate and calcined magnesia, of chemical compounds used in iron-enamelling and glass and pottery work, of creosote, pitch, &c. The manufacture of colours, paints, distempers, and varnishes is carried on to a considerable extent at the Shandon Chemical Works, and it is stated that Messrs. Harrington are the only firm in Ireland who are making distempers and varnishes. Inks for news, poster, letterpress, and lithographic purposes are also manufactured. In dealing with the leather industry, under the head of "Tanning," it is stated:—

In the early part of the 19th century the manufacture of leather was a very important and flourishing industry in many districts throughout the country. Not only did Ireland produce the great bulk of the leather required for home use, but regularly shipped large quantities abroad. At that time Cork was a very important centre of the Irish tanning industry. In 1837 no fewer than forty-six tanyards were at work here, giving employment to over 600 hands, and tanning on an average 110,000 hides annually. About 1845 there were sixty tanyards in the city of Cork, besides those in the towns of Cork County. The firms of Dunn, Hegarty, Lyons, Murphy, and Ryan were widely known in connection with the industry. At this period the stout butts tanned in Cork were famous in England and Scotland, and were in much demand by buyers in the West Riding of Yorkshire. Michael Dunn tanned an equally famous sole butt. William Hegarty, who went into French factories as a working man in order to make a detailed study of the processes there employed, established, with his brother, calf-skin tanning and currying on such a scale as to give extensive employment in Cork. The industry thus continued to flourish, and the upper and sole leather produced in Cork City and County established for itself a high reputation.

From 1846 the industry declined. In 1853 Cork had only sixteen tanneries. By 1893, with a few notable exceptions, such as the firms of Messrs. Hegarty & Sons, employing over 200 hands, and Messrs. Dunn Bros., the tanning industry was lost to Cork. The former firm was subsequently closed, and the latter, now the sole remaining one, is the property of the Cork Tanning Co., owned by Mr. Beamish and Mr. Crawford who, rather than allow this industry to die, some years ago purchased the tanyard, which is now being considerably developed on modern lines. The decline of the tanning industry was due to various causes. The famine of 1846-48 had its effect, as had also the adoption of Free Trade by the United Kingdom at a time when Ireland required protection for her struggling industries. But the main reason was the reluctance of the Irish manufacturer to conform to modern ideas. The Irish leather was worked through the tanyard in the old fashion, which took not less than a year. Although the product from this system was of a more durable nature than that produced by means of more modern methods, the consumer on the whole found the cheaper leather to satisfy his requirements. Thus the imported leather, prepared by the use of chemicals in about half the time, displaced the product of the Cork manufacturers, who were unwilling to increase their capital expenditure by laying down modern plant and adopting the latest methods.

THE CHEMISTS' YEAR BOOK, 1919. By F. W. ATACK, M.Sc. London: Sherratt & Hughes. Price 15s. 6d.

CHEMISTS in general in this country have been by no means well provided for in the way of handy references and pocket-books. It is to Germany once more that they have looked for companions of the kind, but there is no reason why our industrial endeavours to become chemically independent should not be coupled with similar efforts in a literary direction. German scientific and chemical publications were so profuse in the days before the War that the chemist, in order to excel, was almost compelled to shoulder the burden of acquiring a knowledge of the German language in addition to his purely technical studies. There can be no question that Germany largely attained fame as a chemical nation by the immense advertisement she made out of her specialised literature, aided by her system (as Professor Henry Louis has remarked) of attaching the names of her chemists to processes which, in most cases, originated in countries other than her own. It is a sign of encouragement, therefore, to find that sincere attempts are now being made to supplement our own technical literature both in the direction of text-books and newspapers.

The first volume of Mr. Atack's pocket-book consists of a tabulation of innumerable data of special use to the analytical chemist, who, however much he may have profited from modern systems of memory training, could never aspire to retain in his head such a miscellany of facts and figures. All this information is well collated, but one is, perhaps, inclined to wonder why such items as triginometrical formulæ should be included, unless the author happens to appreciate the inherent inability of the scientist to grapple with elementary mathematics, though he juggles to his heart's content with stupendous formulæ and unutterable words. Of the 420 pages in the first volume no less than 237 are given over to a description of the general properties of inorganic substances, with particulars of their various formulæ, molecular weights, boiling and melting points, &c. This section, although as it stands it must have called for some laborious work, is not exactly complete, and one notices a few important omissions, such, for instance, as the double cyanides.

It has been regarded as an unwritten law of the pocket-book that in a condensed production of the kind there can be no room for historical matter. Mr. Atack, however, evidently has other opinions in that he commences his second volume with references which take us back to Hippocrates and Pythagoras. The writer does not in any way wish to disparage the author's predilection for ancient history, but a pocket-book is the type of publication which should essentially consist of a single volume, and with a clean cut of some of the embellishments there should be no difficulty in doing this in the present instance. The matter included in the second volume is far too diverse to receive any detailed mention in a review, for it covers a remarkably wide range in pure and manufacturing chemistry, and even launches out in medical terms. The pocket-book is well worth purchasing, particularly as in these expensive days its price is moderate. Any little defects or omissions which are in evidence can be readily attended to in the succeeding issues, and it is to be trusted that the author will appreciate the value of his readers' time and extend his index considerably.

A. M.

Ramsay Memorial Fund

Its Relation to the Chemical Industry

THE claim of the Ramsay Memorial Fund on the chemical industry of Great Britain hardly needs to be stated. In the words of the official appeal, for thirty-five years Sir William Ramsay occupied a foremost place in the ranks of scientific investigators, and his discoveries in the realm of chemical science had earned for him a world-wide reputation. Our readers are aware that the Memorial Fund was instituted in 1917 to raise £100,000 for the advancement of chemical science, and that it was decided to apply the larger portion of the fund to two objects—(1) The provision of Ramsay Research Fellowships, tenable wherever the necessary equipment exists; that is to say, not necessarily in a University, but possibly in works and other approved centres; (2) the establishment of a Ramsay Memorial Laboratory of Chemical Engineering at University College, that college being selected because Sir William was connected with the University for the greater part of his professorial career.

In deciding on the laboratory the Executive Committee were deeply impressed with the importance of providing further teaching in relation to chemical and metallurgical industries. Many chemists who have gone through their full chemical training in one of the universities or schools of Chemistry are called upon to plan and carry out schemes for the application of chemical principles to undertakings on a commercial scale. Comparatively few young chemists have obtained the necessary experience for doing this, as the application of engineering principles to chemistry on a commercial scale has not formed part of their training. The possibility of developing a School of Chemical Engineering for the benefit of young chemists who look forward to an industrial career was already engaging attention in the University of London, and plans were already on foot at University College, London, for the establishment of such a Laboratory as a part of a larger and more comprehensive scheme for the reconstruction and re-equipment of the Engineering Departments at that College. It appeared to the executive committee that, as Sir William Ramsay was for twenty-six years closely associated with University College, London, and made his most important discoveries while holding the Chair of Inorganic Chemistry at that college, no more fitting place for a Ramsay Memorial Laboratory of Chemical Engineering could be found.

The time, with its many urgent war claims, has not been the most propitious for memorials or any other public movements, but it was gratifying to hear the other day from Dr. Seton, the organising secretary of the Fund, of the substantial progress made. "About £44,000," he said, "has been already collected, and in addition an appeal is now actively being made in France, where it is hoped to raise one million francs for the establishment of Ramsay Memorial Fellowships to be tenable in the United Kingdom by French chemists. The idea is largely that of promoting the international *entente* between Great Britain and France, and it is intended that the money should be contributed mainly, though not exclusively, by British and American residents in France, and by people in this country interested in Anglo-French relations. It is also thought that this movement might be in a sense a tribute to the remarkable achievements of France during the war, in the domain of science. In addition to this the Governments of some of the allied and neutral nations have already decided to found, or are now considering the possibility of founding, one or more Ramsay Memorial Fellowships for the purpose of bringing chemists from those countries to study in the United Kingdom. Among these nations may be mentioned Italy, Greece, Norway, Spain, and Japan.

"Coming to chemical engineering in particular," Dr. Seton said, "the conception of the chemical engineering laboratory is that when young chemists have had their full course in pure chemistry at the University they find themselves often unable to tackle the problems which present themselves to the works chemist, or to the chemist who is practising what may be called industrial chemistry, because they have only worked on the experimental side and do not understand how to convert their knowledge into the form which is necessary to enable them to deal with problems involving large operations and engineering problems. Consequently, the idea in establishing a laboratory of chemical engineering is that the young chemist either concurrently with his training in pure chemistry or during a post-graduate year should gain an insight into such engineering problems, and he will be able to gain that insight in this laboratory, which is intended to give some necessary knowledge of engineering to chemists. In these days, with the experience of the war fresh in our memories, it is hardly necessary to emphasise the importance of applied chemistry, and in the commercial developments of the future the necessity of bringing research and industry into closer and more practical relations is more and more recognised.

"The laboratory," Dr. Seton added, "will be adjacent to the existing engineering laboratories of this college, and the college authorities are in a position to provide a suitable site without cost to the Ramsay Fund. The committee have already offered £25,000 of the sum collected to the Senate of the University and the Senate have gratefully accepted that offer. It must not, however, be supposed that all that is required is now provided. Quite apart from the site, the minimum cost of erecting and equipping the laboratory of chemical engineering is £60,000, and if prices continue to increase it may be still more. Consequently, it will be necessary to find at least another £35,000 for the scheme to be carried out."

An Appeal

To the Editor of THE CHEMICAL AGE.

SIR,—May we, through your columns, invite the attention of all who are interested in the promotion of an intellectual *entente* between France and Great Britain to the appeal which has been issued in France by the French branch of the Ramsay Memorial Fund?

The French branch of the Ramsay Memorial Fund, under the presidency of Mr. Lloyd George, are asking for contributions to a fund of one million francs for the purpose of founding Ramsay Memorial Fellowships in Chemical Science similar to those to be founded in this country, such French Fellowships to be available for bringing to this country for purposes of research chemists trained in the universities and technical colleges of France.

The appeal in France is being directed specially to British and American residents in France, and to the large number of persons of all nationalities who have for many months past been enjoying the hospitality of France during their duties in connection with the Peace Conference. It is hoped that many will wish to take this opportunity of signifying publicly their admiration and affection for France, and their esteem for the remarkable scientific achievements of France during the War.

Any subscribers in this country who wish to associate themselves with this branch of the Ramsay Memorial Fund can send their subscriptions to the Hon. Treasurer, Lord Glenconner, at University College, London, indicating their wish that the subscriptions should be earmarked for this purpose.—Yours, etc.,

GLENCONNER.
BURNHAM.
H. A. L. FISHER.
H. H. ASQUITH.
HUGH BELL.

Ramsay Memorial, University College,
July 4.

From Week to Week

An Australian syndicate has been formed for the manufacture of commercial alcohol in Papua.

A message from Antwerp states that a sugar refinery has collapsed at Turlemont, burying all the employees.

The Briton Ferry Chemical and Manure Works are being largely extended for the purposes of manufacturing patent manure on a large scale.

Professor Findlay, of Aberystwyth, has been appointed to the Chair of Chemistry at Aberdeen University in succession to Professor Soddy, who had held the position since 1914.

For some considerable time a factory at Valby, near Copenhagen, has been trying to produce dyes, and its efforts have been crowned with success. It is intended to develop an independent Danish chemical dyes industry.

Mr. Henry Edward Cox, A.I.C., chief assistant to Mr. G. Rudd Thompson, public analyst for Monmouthshire, has passed the examination of the University of London, and become a Master of Science of that University.

A *Reuter's* message from Melbourne states that the negotiations between the Commonwealth and the Imperial Governments with a view to expediting the development of the Papuan oilfields on a mutual basis have been successfully concluded.

Borax Consolidated, at a meeting to be held on July 22, will submit proposals to the shareholders for increasing the company's capital to £2,900,000 by the creation of 600,000 new Deferred Ordinary shares of £1 each, to rank equally with the original Deferred Ordinary Shares.

The Board of Trade made the following announcement on Saturday last:—In view of the raising of the blockade, the Board of Trade have issued general licences under the Trading with the Enemy legislation authorising, with certain reservations, the resumption of trade with Germany and German-Austria.

The late Sir William Crookes, O.M., F.R.S., of 7, Kensington Park Gardens, aged 86, the famous scientist, President of the Chemical Society in 1888 and 1889, President of the Royal Society in 1913-15, and held the Royal Davy and Copley Medals of the last society, has left estate valued at £29,013 (net personalty £16,977).

Mr. George Croll (Messrs. Harrisons & Crosfield) and Mr. J. Dewrance, M.Inst.Met. (Messrs. Babcock & Wilcox) are among those appointed Members of the Committee of the London University Senate, which will administer the new Degree of Commerce. The Committee is composed of thirty-three members, twenty of whom are influential business men.

The Worshipful Company of Dyers have awarded their gold medal to Mr. L. Guy Radcliffe, of the College of Technology, Manchester, for his researches in connection with the sulphoytion of oils. Much of his research work has been carried on at the Bradford laboratories of the Society of Dyers and Colourists. Mr. Radcliffe's researches throw considerable light on the use of oils in the leather and dyeing industries.

In accordance with the arrangement proposed by Mr. Bonar Law in the House of Commons on Monday night, the Board of Trade have made an Order postponing for the present the operation of the Coal (Pit's Mouth) Prices Order, 1919, increasing the price of coal by 6s. per ton. The operation of the directions increasing the price of coal, coke-oven coke and patent fuel for export or bunkers by 6s. per ton is similarly postponed.

Mr. G. Rudd Thompson, public analyst for Monmouthshire, has been appointed by the Society of Public Analysts to represent them upon the Standards Committee of the Institute of Chemistry "to consider the advisability of making provision for the preparation and issue of authoritative samples of chemical substances, ores, metals, &c., of ascertained composition," which will be officially recognised as standards of purity for national use.

Before the New York section of the Society of Chemical Industry, Alexander Silverman, of the University of Pittsburgh, recently described a new lamp outfit for photomicrographic work, which is said to be very convenient for metallographers. The illumination is said to give remarkable microscopic detail. A special rheostat is provided for the current regulation, and the amp may be connected with circuits of 110 volts or 220 volts.

The consolidation of interests in the Belgian glass industry recently announced in the *Board of Trade Journal*, appears to be taking root in other industries. According to the Press, a metallurgical trust, representing 300,000,000 francs capital, is in process of formation. It is expected, in spite of the opposition of conflicting interests, that this will embrace the whole industry. After rebuilding and re-equipping existing works, the trust proposes to build three or four large factories, each specialising in the production of selected classes of goods.

The Brazilian commercial delegates, who last week visited Glasgow for a few days, concluded their tour of the West of Scotland by paying a visit to the Ardeer Factory of Nobel's Explosives Company, Ltd., at Stevenston. The party, which is travelling under the auspices of the Federation of British Industries, left Glasgow by special train, and on arrival at Stevenston were conducted over the extensive works, where they had opportunity of witnessing the manufacture of various explosive agents. This was the first occasion since the war on which the the works have been opened to inspection, and much interest was shown in the various demonstrations.

Professor Archibald Barr, speaking at the Scientific Products Exhibition at Central Hall, Westminster, on Monday, corrected a statement which, he said, had been frequently made in regard to comparisons between British and German glass, to the effect that this country had been dependent upon optical glass made in Germany for a variety of instruments, including range-finders. The fact was that for at least thirty years glass for range-finders had been practically wholly of British manufacture. Even when we supplied range-finders to foreign countries—for example, to Austria—when the Austrians tested the British glass as against German they gave their verdict in favour of that manufactured in England, as being better for its purpose than Jena glass made in Germany.

After an interval of five years, the twentieth annual Chemists' Exhibition was opened on Monday at the Northampton Institute, St. John's Road, Clerkenwell, E.C. It is claimed that this is the biggest trade gathering of retail chemists in the world. More than 100 firms are exhibiting. Products are shown which were at one time German, but which war needs have turned, with their "secrets" of manufacture, into the hands of British firms. Among the novelties to be seen are a substitute for cocaine, of purely synthetic origin; an apparatus for producing pure ozone from the atmospheric air, which it is said has already been used with remarkable success in tubercular conditions; and a display of chemical apparatus made of silica, which will stand sudden variations of temperature.

A consignment of 1 ton 13 cwt. of sugar, in bags, arrived at Brecon recently in a railway truck, which also contained two drums of weedkiller, a highly poisonous fluid. Through some accident en route the whole of the contents of the two drums escaped and soaked into a number of the bags of sugar. Rain penetrating through a hole in the tarpaulin spread the poisonous infection. Fortunately, the loss of the weedkiller from the drums was discovered before the sugar was removed, otherwise the wet state of the sugar bags might not have aroused suspicion. The matter was reported to the borough health officials, and they, with the concurrence of the railway authorities and the consignee, took possession of the whole consignment of sugar, it being impossible to differentiate between safe and unsafe bags.

A Government Bill was introduced into the French Chamber of Deputies on June 17, to institute a Government monopoly in the purchase and importation of refined oils and petroleum spirit in France, Algeria, and the French Colonies, through the medium of a Central Office attached to the Ministry of Finance. The introductory memorandum to the Bill explains that the purchase and importation of such oils and spirit is, in fact, already a Government monopoly, the Commissioner-General of Spirit and Fuel being, under a Decree of August 21, 1918, the sole purchaser and importer. The existing position as regards the importation, sale, &c., of the products in question is based on an agreement between the French Ministries of Commerce and of Supply with the ten largest French petroleum importing houses (setting up the consortium for the importation of spirit and petroleum) which is to come to an end at latest six months after the signature of the Treaty of Peace. The present measure, therefore, confirms a situation of fact and gives the Government the complete monopoly of the purchase and importation of refined oils and petroleum spirit. Further measures, the *Board of Trade Journal* states, are also foreshadowed, dealing with the distribution of the monopolised products.

References to Current Literature

Only articles of general as distinct from specialised interest are included and given in alphabetical order under each geographical subdivision. By publishing this digest within two or three days of publication or receipt we hope to save our readers time and trouble; in return we invite their suggestions and criticisms. The original journals may be consulted at the Patent Office or Chemical Society's libraries. A list of journals and standard abbreviations used will be published at suitable intervals.

British

CONCRETE. Light-weight concrete. W. L. Scott, *Engineering*, July 11, 33. A description of the manufacture of a product weighing about 110 lb. per cubic foot.

EXHIBITION. The British Scientific Products Exhibition. *Chem. Trade J.*, July 12, 32-35, and *Engineering*, July 11, 52-55. Interesting accounts of some features of the Exhibition.

ORGANISATION. Chemistry in reconstruction. Sir W. A. Tilden. *Chem. Trade J.*, July 11, 33-34. Abstract of lecture delivered at the Scientific Products Exhibition.

"Work-blindness" in chemical industries: its prevention and cure. *Chem. Trade J.*, July 11, 31-32. "Work-blindness" is defined as the inability to see defects.

PLATINUM. Platinum in Spain. F. Gillman. Trans. Inst. Min. and Met., Vol. 26, 194-195. Notes on the work now in progress to investigate fully the known deposits.

French

COKE. The conditions of the formation of coke. G. Charpy and G. Decorps. *Comptes rendus*, June 30, 1301-1305. A description of experiments on the coking of coals high in volatile matter.

HEATING. Heating of large industrial buildings. A. Beaurrienne. *Bull. Soc. Ing. Civils de France*, Jan.-Mar., 49-77. A discussion of the principles of heating factories and other large buildings.

WASTE PRODUCTS. The recovery and utilisation of residues and by-products. C. Frabot. *Bull. Soc. Ing. Civils de France*, Jan.-Mar., 7-26. Notes on the utilisation of sewage products and slaughter-house waste.

United States

ANALYSIS. New and rapid apparatus for electrochemical analysis. J. T. King. *Chem. and Met. Eng.*, July 1, 25-29. A description of new apparatus and tests made therewith.

BRASS. Utilisation of electric brass furnaces. H. W. Gillett. *J. Ind. Eng. Chem.*, July, 664-668. Data as to working and costs are given.

CHLORINE. The U.S. Government chlorine-caustic soda plant at Edgewood Arsenal, Edgewood, Md. S. M. Green. *Chem. and Met. Eng.*, July 1, 17-24. A fully illustrated account of the works and its activities.

GAS. Manufacturing plant of the Providence Gas Company. W. M. Russell. *Chem. and Met. Eng.*, July 1, 34-39. An illustrated account of the plant.

HELIUM. Bibliography of helium literature. E. R. Weaver. *J. Ind. Eng. Chem.*, July, 682-688.

MEETINGS. Meeting of the American Institute of Chemical Engineers. *Chem. and Met. Eng.*, July 1, 5-15. An account of the meeting held at Boston and Cambridge, Mass., on June 18-21.

METERS. Gas flow meters for small rates of flow. A. F. Benton. *J. Ind. Eng. Chem.*, July, 623-629. Anaccurate resistance type of meter for this work is described.

NICKEL. Treatment of low grade nickel ores. C. W. Davis. *J. Ind. Eng. Chem.*, July, 644-648. The experiments show the possibility of economically treating certain of these ores.

ORGANISATION. Present status of labour in the English Chemical Industry. A. E. Marshall. *Chem. and Met. Eng.*, July 1, 16.

PACKING. Shipping containers. C. P. Beistle. *J. Ind. Eng. Chem.*, July, 674-682. A fully illustrated article on the packing of dangerous materials for shipment.

SAWDUST. Reaction products of alkali-sawdust fusion. S. A. Mahood and D. E. Cable. *J. Ind. Eng. Chem.*, July, 651-655. The yields of acetic, formic, and oxalic acids and of methyl alcohol obtainable are indicated.

STEEL. Determination of vanadium in steel by electrometric titration. G. L. Kelley, J. A. Wiley, R. T. Bohn, and W. C. Wright. *J. Ind. Eng. Chem.*, July, 632-634.

German

CARBONISATION. A new method of low-temperature carbonisation. F. Fischer and W. Gluud. *Ber.*, June 14, 1035-1039. A new type of rotary retort is described.

COAL PRODUCTS. Benzine from coal. F. Fischer and W. Gluud. *Ber.*, June 14, 1053-1069. This paper contains the results of the examination of the light oil (containing no benzol) from low-temperature carbonisation.

Paraffins from coal. W. Gluud. *Ber.*, June 14, 1039-1053.

FATS. Production and saving of fats. A retrospect of the food question during the war. R. Cohn. *Z. angew. Chem.*, June 24, 193-198.

GAS. Cost of water gas. R. Geipert. *J. Gasbeleucht*, May 24, 269-274. Data are given calculated from many tests.

Production of gas from municipal sewage sludge. M. Hönig. *J. Gasbeleucht*, May 24, 278-282. A number of results obtained in Germany are detailed.

IRON. Determination of iron in iron ores by permanganate. L. Brandt. *Chem. Zeit.*, June 21, 373-374.

LIME. Lime-mortar. V. Kohlschütter and G. Walther. *Z. Elektrochem.*, June 1, 150-183. A record of a research carried out from the physico-chemical and colloid point of view.

MERCURY. Mercury production in Europe. H. Troegel. *Metall. u. Erz.*, June 8, 243-247. Gives statistics of output for recent years.

PEACE TREATY. Our counter-proposals to the peace conditions. *Chem. Zeit.*, June 24, 379-380.

REFRACTORIES. Heat conductivity and specific heat of refractory materials for furnace construction. E. Czakó. *J. Gasbeleucht*, May 24, 274-278. Notes on the application of these values in thermal calculations.

SULPHURIC ACID. The mineral acid industry in 1917-1918. K. Reusch. *Chem. Zeit.*, June 24, 377-379. Deals with the chamber process, the contact process, and waste acid.

WAR. Gas as a munition of war. *Chem. Zeit.*, June 10, 365-367. A short historical account of gas warfare.

Miscellaneous

BEARING METALS. Simple method for analysing bearing metals and similar alloys. G. Oesterheld and P. Honegger. *Helv. Chim. Acta*, July 1, 398-416.

CHLORINE. Technical uses of chlorine. K. Ono. *J. Chem. Ind. Tokyo*, Feb., 113-121. A useful general article.

CYANIDES. Synthesis of alkali cyanide from nitrogen. R. Hara and R. Hayashi. *J. Chem. Ind. Tokyo*, Mar., 175-202. Satisfactory results were obtained with Bucher's process, an 80 per cent. conversion of sodium carbonate being effected.

NITRIC OXIDE. Effect of reduced pressures on the conversion of nitrogen to nitric oxide by means of the electric arc. E. Briner and P. Naville. *Helv. Chim. Acta*, July 1, 348-352. The best yields were obtained with excess of nitrogen.

PLATINUM. Method of analysing platinum ores, and the chemical composition of native platinum from the Urals. L. Duparc. *Helv. Chim. Acta*, July 1, 324-337. The samples of platinum examined contained 60—88.5 per cent. Pt.

POTASH. Potassium chloride from the mother liquors in the manufacture of sea salt. T. Nishimura. *J. Chem. Ind. Tokyo*, Apr., 255-288. Notes on the best method of increasing the yield of carnallite.

RUBBER. Natural and artificial rubber. A. Tschirch. *Schweiz. Chem. Zeit.*, 1919, pts. 16-17, 153-156.

SODA. Raw materials of soda in China. S. Ochi. *J. Chem. Ind. Tokyo*, Mar., 202-204. A study of certain Chinese salt deposits and their possibilities for the manufacture of soda.

SWITZERLAND. Developments of the Swiss chemical industry. *Schweiz. Chem. Zeit.*, 1919, pts. 16-17, 150-166. Statistics for the years 1912 to 1918 are given.

THERMO-COUPLES. Standardisation of rare metal thermo-couples. K. Watanabe. *J. Chem. Ind. Tokyo*, Feb., 121-132.

Patent Literature

We publish each week a list of selected specifications as and when they are actually printed and on sale. In addition, we give abstracts within a week of the specifications being obtainable. Readers can thus decide what specifications are of sufficient interest to warrant purchase, the only way of obtaining complete information. Lists of patent applications and of "convention" specifications open to inspection before acceptance are added; abstracts of the latter appear as soon as possible thereafter.

Complete Specifications Accepted, with Application Date

128,227. Light Mineral Oils from Heavier Oils, Production of. S. Maxim and A. W Crosse. June 15, 1916.
128,239. Paraffins, Treatment of Solid. W. Elborne. June 16, 1917.
128,255. Hydrocarbons, Treatment and Production of. G. F. Forwood and J. G. Taplay. July 3, 1917.
128,273. Hydrogen, Process for Preparing from Carbon or Carbon-containing Substances. H. J. Prins. July 9, 1917.
128,297. Copper or its Alloys, Process for Protecting from Attack by Atmospheres or Liquids. Imperial Trust for the Encouragement of Scientific and Industrial Research, Institute of Metals, G. D. Bengough, and O. F. Hudson. July 23, 1915.
112,768. Nickel Catalysers, Process for Regenerating Oxide of. Soc. Industrielle de Produits Chimiques. January 16, 1917.
128,326. Mineral Oils, Production of. J. B. Carper. November 7, 1918.
128,327. Magnesium Chloride, Anhydrous. P. L. Hulin. January 13, 1917.
128,362. Volatile Liquids, Separating the Constituents of Mixtures of. A. G. Green and Levinstein, Ltd. June 12, 1918.
128,375. Furnaces, Gas-Producers and the Like. R. Colombo, J. Cazaban, and M. F. Fernandez. June 17, 1918.
128,396. Sulphuric and Other Acids, Concentration of. G. K. Davis. June 19, 1918.
128,398. Iron and Steel Plates or Sheets, Pickling. H. S. Thomas and W. R. Davies. June 20, 1918.
128,401. Gases from Producers or the Like, Treatment of Liquor from Plants for Purifying. D. M. Holmes. June 20, 1918.
128,452. Cement, Non-porous. F. D. Mulligan. July 21, 1918.
128,477. Phenol Formaldehyde Condensation Products, Compositions containing. G. L. Scott. September 23, 1918.
128,485. Fuel Briquettes, Manufacture of. D. H. Bibb. October 15, 1918.
128,507. Cyanides, Extraction of. W. J. Mellersh-Jackson (From Air Reduction Co.). January 6, 1919.

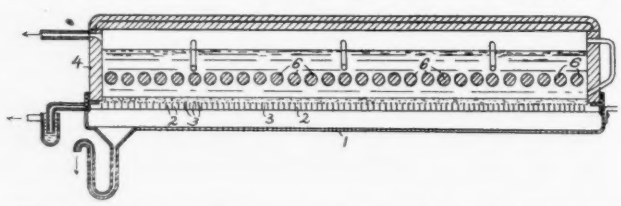
Latest International Specifications Open to Inspection

129,264. Paint or Varnish and Paint or Varnish Ingredients. Koppers Co. June 29, 1918.
129,292. Gases or Gaseous Mixtures, Processes and Apparatus for Cooling or Liquefying. M. Zack. May 30, 1918.

Complete Specifications

121,460. Chlorides of the Alkaline Metals, Apparatus and Process for the Electrolysis of. Norsk Alkali A/S, Trondhjem, Norway. International Convention date (Norway), December 13, 1917. (*See Illustration.*)

A tray 1, of copper or iron, is provided at the top with a closely arranged metal grating 2, covered by a diaphragm 3.



This diaphragm comprises a metal netting having 400-1,000 meshes per sq. cm., which is covered with a paste or semi-liquid suspension of asbestos wool, powdered asbestos, glass wool, or the like, from which the water is then removed by suction. The fibrous material is placed on the netting in layers of increasing fineness, the coarsest being at the bottom, and the whole may be covered with a layer of alumina, silica, iron oxide, barium sulphate or the like, and then with a layer of loose glass wool or asbestos wool. The diaphragm so formed constitutes the cathode. The frame 4 is composed of concrete, shale slates, or other inert material, and carries the anodes 6, which are composed of electrode carbon, artificial graphite, or magnetite.

127,845. Ammonia, Catalytic Oxidation of. E. B. Maxted and T. A. Smith, Walsall. Application date, May 29, 1917.

Ammonia is oxidised by passing it together with air at a pressure of 10-30 atmospheres over any suitable catalyst. The resulting oxides of nitrogen are separated by refrigeration at a pressure equal to or higher than that used for oxidation, and used in the manufacture of nitric acid. An increase in production per unit surface of catalyst is obtained by this process.

127,852. Nitrogen from Air, Process for Obtaining. Elektrizitätswerk Lonza, Gampel and Basle, Switzerland. International Convention date (Switzerland), June 17, 1916.

Ammonium sulphite is first made by direct combination of ammonia and sulphur dioxide in presence of water vapour, and the concentrated solution is sprayed into towers filled with coke through which air is passed in counter-current, so as to oxidise the sulphite into sulphate. This process is preferably carried out at a temperature of 70°-75° C., and is more rapid at the higher temperature. At still higher temperatures the compound dissociates, yielding ammonia, which may be recovered from its mixture with nitrogen. Practically the whole of the oxygen is thus removed from the air, and the pure nitrogen may be used for the manufacture of cyanides, which may then be used for the production of ammonia for the first part of this process.

127,909. Volatile Solvents, Recovery of. H. J. Pooley and G. Scott & Son, London. Application date, June 22, 1917.

To recover volatile solvents used in certain manufactures by means of hot air, the air is maintained in circulation in the drying chamber and a portion only at a time is removed to a plant for the recovery of solvent. The size of the recovery plant is thus reduced.

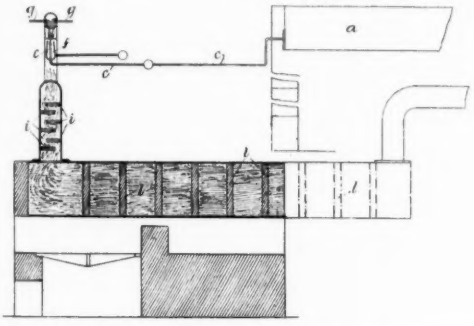
127,916. Producer Gas, Manufacture of. G. Helps, Nuneaton, and J. Harger, Liverpool. Application date, July 10, 1917.

A combustible gas containing less nitrogen than producer gas is obtained by passing air containing a larger proportion of oxygen than atmospheric air through incandescent coal or coke. While the resulting gas is still at a temperature of 900°-1000° C., it is passed over blocks of alkali carbonate, carbon, and iron, whereby alkali cyanide and carbon monoxide are produced and the nitrogen thus eliminated. The fuel gas thus obtained may be mixed with oxygen or air rich in oxygen in such quantity as to be non-explosive.

127,918. Petroleum and Like Oils, Treatment of. E. W. Wynne, Liverpool. Application date, May 29, 1918. (*See Illustration.*)

Relates to the distillation of petroleum and like oils so as to yield a more valuable product and less residue. Crude oil in the tank *a* is partly heated by gases from the furnace *b*, and passes through a pipe *c*, terminating in a nozzle surrounded by another nozzle *f*, to which steam or hot air is supplied. The mixed jet impinges on two or more jets *g*, of ozonised oxygen, and the mixture passes downward by pipes (not shown) and then over the electrodes *i*, where it is subjected to a silent electric discharge of high frequency. The mixture then passes into a still con-

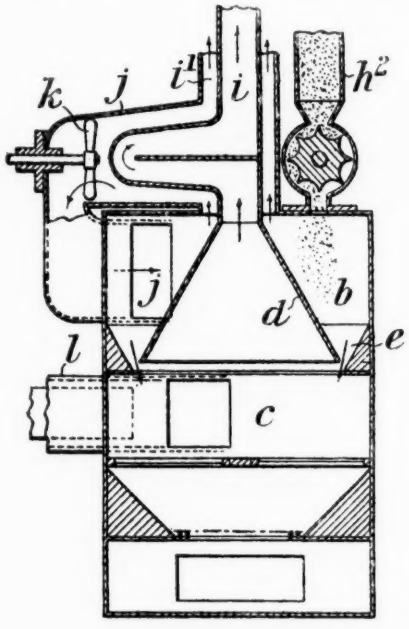
taining electrodes *l*, for further treatment by silent discharge, and thence to an ordinary still. Experiments showed that the flash point of American petroleum was thus increased 25 per



cent. and the final residue decreased 25 per cent., compared with ordinary methods.

127,933. Gas from Coal Dust or the Like, Means for Generating. J. H. Corthesy and S. T. S. Castelli, London. Application date, May 8, 1918. (*See Illustration.*)

Pulverised fuel is introduced by the pipe h^2 into the distilling chamber *b*, which is provided with a hollow cone *d* separating it from the generating chamber *c*, but leaving an annular passage *e*. The solid residue falling into the chamber *c* is burnt by



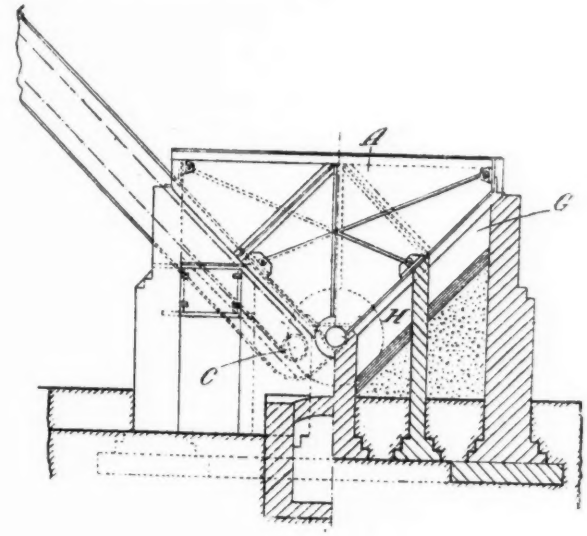
a current of air introduced tangentially through the conduit *l*, and the hot fuel gases pass upward through the cone *d* and passage *i*. Distillation products from the chamber *b* pass upward by the tortuous passage *j*, i^1, so that they abstract some heat from the hot gases in the passage *i*, and a portion of these products is withdrawn and reintroduced tangentially by the fan *k* into the chamber *b* to accelerate the distillation.

127,974. Gas Generators or Producers. H. Francart, London. Application date, June 8, 1918.

A combustion chamber is embedded centrally within the fuel chamber of a retort, and communicates with it. Air and steam are injected into the combustion chamber, where they meet an excess of gas, and partial combustion takes place. The products at a comparatively low temperature then pass through the fuel to regenerate them and maintain the fuel at a uniform temperature laterally.

127,954. Evaporating or Drying Apparatus. The Salt Union Ltd., and G. W. Malcolm, Winsford, Cheshire. Application date, June 5, 1918.

The liquid, e.g., salt solution is contained in a trough A, of triangular cross section, which is heated by a furnace below, the



hot gases of which pass through the horizontal flue G and back through the flue H. A conveyor C is provided for removing the deposited solid.

127,986. Retort, Vertical. J. A. Yeadon, Leeds. Application date, June 12, 1918.

A vertical retort for carbonising coal, which is externally

heated, is made with longitudinal corrugations to increase the heating area. (*See illustration.*)

127,987. Oils, Fats and Other Liquids or Compounds, Heating by Electricity for Distillation or Other Purposes. H. Alexander and W. T. Vint, Leeds, and A. Imbery, Halifax. Application date, June 12, 1918.

The electric heating element is wound on a horizontal cylinder which is provided with radial vanes and immersed in the liquid. The cylinder is rotated during the passage of the current.

128,144. Solids or Semi-Solids such as Sewage, Paper-Pulp or the Like, Separating from Liquids. P. Smith, London. Application date, January 25, 1919.

In apparatus for separating solids or semi-solids such as sewage, paper-pulp or the like from the contained liquid by pressing the material between a travelling band and a number of rotating rollers, all the rollers are flanged at both ends to prevent loss of material.

International Convention Specifications open to Inspection, but not yet Accepted

126,270. Paints, Varnishes, &c. M. Holzapfel, Newcastle-on-Tyne. International Convention date, May 3, 1918.

Wood tar is heated under oxidising conditions in the presence of basic metal compounds such as lime, with or without zinc oxide, red lead, litharge, manganese oxide, or like driers. The temperature is kept at about 250° C. for half an hour, and the product is dissolved in turpentine, benzine, or other hydro-carbon to the consistency of varnish, or it may be ground up with pig-

ments and used as a paint. The wood tar may be previously distilled to remove pitch, and a small amount of whale or fish oil, fats, or fatty acids may be added at any stage of the process.

126,274. Zinc Sulphides. P. Comment, Dijon, France. Addition to 106,489. International Convention date, April 30, 1918.

The principal specification describes the production of zinc sulphide by calcining zinc persulphide ZnS_2 with zinc sulphate and alkali sulphate. In this addition, the alkali sulphate may be wholly or partly replaced by a sulphite, hyposulphite, thionate, &c., which is capable of producing the sulphate under reaction conditions. The zinc persulphide may be replaced by a polysulphide containing less sulphur.

126,279. Catalytic Apparatus. Soc. Chimique des Usines du Rhone, Paris. International Convention date, May 3, 1918. 1918.

A catalyst which is used for gaseous reactions may be an electric conductor or may be incorporated with a conductor so that it may be heated electrically. Granulated coke or a mixture of powdered charcoal and alumina may be used, and are suitable for, *e.g.*, the combination of acetaldehyde and air at 100° C. to give acetic acid, the dehydration of alcohol vapour at 360° C. to produce ethylene, and the production of acetone from acetic acid at 460° C.

126,289. Steel Alloys. Cie. d'Applications Mecaniques, Paris. International Convention date, May 2, 1918.

A steel alloy for ball bearings contains carbon 0.8-1.5 per cent., chromium 0.2-2.0 per cent., and vanadium 0.1-0.5 per cent., with small quantities of nickel, cobalt, tantalum, manganese, phosphorus, silicon, and sulphur.

126,296. Zinc, Obtaining Electrolytically. Electrolytic Zinc Company of Australasia Proprietary, Melbourne. International Convention date, April 27, 1918.

Solutions obtained from the ores are purified by limestone and zinc dust or "blue powder," and electrolysed with the addition of glue to counteract the effects of cobalt and nickel. The solution is then used again for treating the ore. Cobalt is removed when it has accumulated to the extent of 200-300 mg. per litre.

126,303. Manganese. C. L. Lenoir, Arreau, France. International Convention date, January 8, 1914.

When manganese ores are reduced in an electric furnace to produce the metal and its alloys, slag from previous operations is added to reduce volatilisation losses. Alumina may be added to reduce the amount of manganese carried away by the slag.

Trade Enquiries

Genoa

HEAVY CHEMICALS, PHARMACEUTICAL PRODUCTS, DYES, &c.—A Genoa agent wishes to represent manufacturers and exporters of heavy chemicals, pharmaceutical products, aniline dyes, waxes, gums, oils, glues, drugs, wood pulp, &c. (1,700.)

PAINTS, TANNING MATERIALS, FERTILISERS, &c.—An agent at Genoa seeks agencies for paints and varnishes, tanning materials, fertilisers, lubricating oils, caustic soda and drugs. (1,701).

CHEMICALS AND COLOURS.—A Genoa firm seeks connections with large manufacturers of chemicals and colours. (1,716.)

DYESTUFFS, CHEMICALS AND TEXTILES.—A Genoa merchant would represent on commision, manufacturers and exporters of dyestuffs, chemicals, and textile materials. (1,707.)

Roumania

CHEMICALS AND DRUGS.—A commission agent in Bucharest desires to enter into business relations with United Kingdom manufacturers of chemicals and drugs, with a view to representing them in Roumania.

Sweden

CHEMICALS.—A firm of steamship owners, brokers, forwarding agents, &c., at Carlstad, wish to represent, preferably as sole agents, on a commission basis, United Kingdom manufacturers, or, failing manufacturers, exporters of chemicals (particularly those used in pulp and paper-making).

Stocks and Shares

Commercial, Industrial, &c.

	Quotations July 9	Quotations July 16
Alby United Carbide Factories, Lim., Ord.	$\frac{15}{16}$–1 $\frac{1}{16}$	$\frac{15}{16}$–1 $\frac{1}{16}$
Associated Portland Cement Manufrs. (1900.) Lim., Ord.	7 $\frac{7}{8}$–8 $\frac{1}{8}$	7 $\frac{13}{16}$–8 $\frac{1}{16}$
Bell's United Asbestos Co., Lim., Ord.	2–2 $\frac{1}{4}$	2–2 $\frac{1}{4}$
Bleachers' Association, Lim., Ord.	1 $\frac{1}{4}$–1 $\frac{5}{16}$ xd	1 $\frac{9}{32}$–1 $\frac{11}{32}$
Borax Consolidated, Lim., Prefd. Ord.	4 $\frac{1}{8}$–4 $\frac{5}{8}$	4 $\frac{1}{4}$–4 $\frac{3}{8}$
Bradford Dyers' Assoc. Lim., Ord.	2 $\frac{1}{8}$–2 $\frac{1}{4}$	2 $\frac{1}{8}$–2 $\frac{1}{4}$
British Aluminium Co., Lim., Ord.	1 $\frac{11}{16}$–1 $\frac{13}{16}$	1 $\frac{11}{16}$–1 $\frac{13}{16}$
British Oil and Cake Mills, Lim., Ord.	1 $\frac{7}{8}$–2	2–2 $\frac{1}{8}$
British Portland Cement Manufrs., Lim., Ord.	33/6–35/6	33/0–35/0
Brunner, Mond & Co., Lim., Ord.	1 $\frac{7}{8}$–2xd	1 $\frac{7}{8}$–2
Castner-Kellner Alkali Co., Lim.	2 $\frac{5}{8}$–2 $\frac{7}{8}$	2 $\frac{5}{8}$–2 $\frac{7}{8}$
China Clay Corporation, Lim., Ord.	$\frac{1}{4}$–$\frac{3}{8}$	$\frac{1}{4}$–$\frac{3}{8}$
Cook (Edward) & Co., Lim., 4% 1st Mort. Deb. Stock Red.	57–61xd	57–61
Courtaulds, Lim.	10 $\frac{1}{4}$–10 $\frac{3}{4}$	10–10 $\frac{1}{2}$
Crosfield (Joseph) & Sons, Lim., Cum. 6% Prefce.	$\frac{7}{8}$–1 $\frac{1}{8}$xd	$\frac{7}{8}$–1 $\frac{1}{8}$
Curtis's & Harvey, Lim.	2 $\frac{9}{16}$–2 $\frac{13}{16}$	2 $\frac{9}{16}$–2 $\frac{13}{16}$
Explosives Trades, Lim., Ord.	21/6–22/0xd	21/6–22/6
Field (J. C. & J.), Lim., Ord.	$\frac{7}{16}$–$\frac{9}{16}$	$\frac{7}{16}$–$\frac{9}{16}$
Greenwich Inlaid Linoleum (Fredk Walton's New Patents) Co., Lim., Ord.	$\frac{1}{2}$–$\frac{5}{8}$	$\frac{1}{2}$–$\frac{5}{8}$
Harrison & Crosfield, Lim., 10% Cum. Prefd. Ord.	1 $\frac{11}{32}$–1 $\frac{15}{32}$	1 $\frac{11}{32}$–1 $\frac{15}{32}$
India Rubber, Gutta Percha and Tel. Wks. Co., Lim., Ord.	17 $\frac{1}{4}$–17 $\frac{3}{4}$xd	17 $\frac{1}{4}$–17 $\frac{3}{4}$
Lawes' Chemical Manure Co., Lim., Ord.	6–6 $\frac{1}{4}$	6–6 $\frac{1}{2}$
Lever Bros., Lim., 6% Cum. "A" Prefce.	19/0–19/6	19/1 $\frac{1}{2}$–19/7 $\frac{1}{2}$
Do. 6 $\frac{1}{2}$ % Cum. "B" Prefce.	20/3–20/9	19/10 $\frac{1}{2}$–20/4 $\frac{1}{2}$
Magadi Soda Co., Lim., Ord.	1 $\frac{3}{32}$–1 $\frac{7}{32}$	1 $\frac{3}{32}$–1 $\frac{7}{32}$
Manganese Bronze and Brass Co., Lim., Ord.	$\frac{11}{16}$–$\frac{13}{16}$	$\frac{11}{16}$–$\frac{13}{16}$
Maypole Dairy Co., Lim., Defd. Ord.	1 $\frac{9}{32}$–1 $\frac{11}{32}$	1 $\frac{1}{4}$–1 $\frac{3}{16}$
Mond Nickel Co., Lim., 7% Cum. Pref.	1 $\frac{1}{8}$–1 $\frac{1}{4}$	1 $\frac{1}{16}$–1 $\frac{3}{16}$
Do. 7% Non. Cum. Pref.	$\frac{15}{16}$–1 $\frac{1}{16}$	$\frac{15}{16}$–1 $\frac{1}{16}$
Pacific Phosphate Co., Lim., Ord.	5 $\frac{1}{2}$–5 $\frac{3}{8}$	5 $\frac{7}{16}$–5 $\frac{11}{16}$
Power-Gas Corporation, Lim., Ord.	$\frac{3}{8}$–$\frac{7}{8}$	$\frac{3}{4}$–$\frac{7}{8}$
Price's Patent Candle Co., Lim.	38–40	38–40
Salt Union, Lim., Ord.	1 $\frac{1}{4}$–1 $\frac{3}{8}$	1 $\frac{1}{4}$–1 $\frac{3}{8}$
United Alkali Co., Lim., Ord.	1 $\frac{5}{16}$–1 $\frac{9}{16}$	1 $\frac{1}{2}$–1 $\frac{1}{2}$
Val de Travers Asphalte Paving Co., Lim.	$\frac{15}{16}$–1 $\frac{1}{16}$	$\frac{15}{16}$–1 $\frac{1}{16}$
Van den Berghs, Lim., Ord.	3 $\frac{1}{4}$–3 $\frac{1}{2}$	3 $\frac{1}{4}$–3 $\frac{1}{2}$
Walkers, Parker & Co., Lim.	1 $\frac{1}{16}$–1 $\frac{3}{16}$	1 $\frac{1}{16}$–1 $\frac{3}{16}$
Welsbach Light Co., Lim.	2 $\frac{1}{2}$–2 $\frac{3}{4}$	2 $\frac{1}{2}$–2 $\frac{3}{4}$

Gas, Iron, Coal and Steel

Gas Light and Coke Co., Ordinary Stock (4% Stand.)	57–59	55–57
South Metropolitan Gas Co., Ordinary (4% Stand.)	58–60	55–57
Ebbw Vale Steel, Iron & Coal Co., Lim., Ord.	27/9–28/9	1 $\frac{3}{8}$–1 $\frac{7}{16}$
Hadfield's, Limited, Ordinary	2–2 $\frac{1}{16}$	1 $\frac{7}{8}$–1 $\frac{15}{16}$
Staveley Coal & Iron Co., Lim., Ord.	1 $\frac{3}{4}$–1 $\frac{7}{8}$	1 $\frac{13}{16}$–1 $\frac{13}{16}$
Vickers, Limited, Ordinary	35/6–36/6	35/0–36/0
Armstrong (Sir W. G.) Whitworth, Ltd., Ord.	34/6–35/6	34/6–35/6

Mines, Nitrate, &c.

Rio Tinto Co., Lim., Ord. (Bearer)	59–61	61–62
Antofagasta Nitrate Co. Compañia de Salitres de Antofagasta) 5 $\frac{1}{2}$% 1st. Mt. Debs. Red.	88–93	88–93
Lagunas Nitrate Co., Lim.	1 $\frac{1}{8}$–1 $\frac{3}{8}$ xd	1 $\frac{1}{4}$–1 $\frac{3}{8}$
Tarapacá and Tocopilla Nitrate Co., Lim.	14/0–16/0	14/0–16/0
Anglo-Chilian Nitrate and Rly. Co., Ltd., Ord.	14–15	14–15

Oil and Rubber

Anglo-Persian Oil Co., Lim., Cum. 6% Part.	1 $\frac{5}{16}$–1 $\frac{3}{8}$	1 $\frac{5}{16}$–1 $\frac{3}{8}$
Mexican Eagle Oil Co., Lim. (Cia Mexicana de Pet. "El Aguila" S.A.) Ordinary	8 $\frac{7}{16}$–8 $\frac{9}{16}$	8 $\frac{31}{32}$–33/32
"Shell" Transport and Trading Co., Lim., Ord.	8 $\frac{3}{16}$–8 $\frac{5}{16}$	8–8 $\frac{1}{4}$xd
Do. 5% Cum. Pref.	9–9 $\frac{1}{4}$	9 $\frac{1}{16}$–9 $\frac{5}{16}$
Anglo-Java Rubber & Produce Co., Lim.	5/9–6/3	5/10 $\frac{1}{2}$–6/4 $\frac{1}{2}$
Anglo-Malay Rubber Co., Lim.	13/0–13/6	13/0–13/6
Chersonese (F.M.S.) Estates, Lim.	3/9–4/0xd	3/9–4/0
Linggi Plantations, Lim., Ord.	.. ..	.. ..
Anglo-Maikop Corporation, Ltd., Ord.	6/9–7/9	6/9–7/9
Burmah Oil Co., Ltd., Ord.	12 $\frac{1}{8}$–12 $\frac{3}{8}$	11 $\frac{1}{4}$–11 $\frac{3}{4}$

Market Report and Current Prices

Our Market Report and Current Prices are exclusive to The Chemical Age, *and, being independently prepared with absolute impartiality by Messrs. R. W. Greeff & Co. and Messrs. Chas. Page & Co., Ltd., may be accepted as authoritative. The prices given apply to fair quantities delivered ex wharf or works, except where otherwise stated. Only commodities whose values are at the time of particular interest or of a fluctuating nature are included in our weekly report. A more complete list and report, including a Continental and American report, appears in the first issue of each month, and will include prices of plant supplies, building materials, structural steel, fuels, glues, ores, refractories, metals, minerals, and miscellaneous materials, as soon as the necessary arrangements are completed. Our issue of July 5 contained some of these items. The current prices are given mainly as a guide to works managers, chemists, and chemical engineers; those interested in close variations in prices should study the market report. Suggestions and criticisms in regard to these pages will be welcomed.*

Market Report

Thursday, July 17, 1919

There has only been a moderate business passing in the Home Trade, and business in the Textile districts has not responded to any extent to the settlement of the labour troubles as might have been expected.

There is very little change on the whole in current values. Export trade still remains brisk, business with France in particular being much more active.

The removal of the import prohibition in Italy may also tend to improve the demand on that market.

General Chemicals

Acid Acetic.—Higher prices are being realised for spot parcels.

Acid Lactic.—The price has been slightly reduced for this material, and quite a steady business is being transacted.

Acid Oxalic.—In spite of rumours as to lower prices from the Continent, a fair business is being done at current values.

Ammonia Carbonate.—There has been an increased demand for this product, but supplies are still readily obtainable.

Bleaching Powder.—Trade is still stagnant in this product, with prices in buyers' favour.

Borax.—In view of the sold-up condition of makers, substantial premiums have to be paid for parcels in second hands.

Copper Sulphate.—There is nothing of feature to report in this market, although the home trade remains fairly active.

Potassium Chlorate.—Stocks of this material are being moved off, and spot prices are slightly better.

Sodium Acetate.—Lower prices are again quoted, mainly owing to the current light demand.

Sodium Prussiate.—The market is very quiet and inclined to be weaker.

Heavy Coal Tar Products

There is an active inquiry for a good many of the products, and a number of contracts have been made.

The undertone is very firm, but with the uncertainty prevailing owing to the fuel and political difficulties both buyers and sellers are cautious in their dealings.

Benzole.—Home trade in this product continues fair, and the export quotation remains at about 1s. 9d. to 1s. 10d. per gallon.

Creosote.—There is no change in this position and the market is very neglected.

Cresylic Acid.—A fair business has been passing at slightly lower values, and the figure may be taken to-day at from 2s. 3d. to 2s. 5d. per gallon, f.o.b. in barrels.

Naphthalene.—Although there is very little business to report, the position is firmer, and refined crystals are quoted to-day at about £16 per ton.

Flake.—Trade is stagnant, with a quotation nominally at about £20 per ton.

Solvent Naphtha.—Rather more inquiry is noticed, and quotations are quite firm at 1s. 9d. to 2s. in the North, and about 2s. 2d. to 2s. 3d. in the London district.

Pitch.—This market is still brisk, without change in values.

Sulphate of Ammonia

Export trade is active with a quotation varying between £21 and £31 per ton, according to the market. Home trade prices are without change.

Coal Tar Intermediates

The market for intermediates is quite firm, although buyers show a tendency only to purchase their requirements for their immediate needs.

Alphanaphthol.—A number of orders have been placed for this intermediate.

Betanaphthol.—A steady trade is being done in this product at recently quoted figures.

Paranitraniline.—More interest is being taken in this product, and several fair-sized contracts have just been concluded.

Paraphenylenediamine.—There has been a slight reduction in the value owing to the increased output of the English material.

Current Prices

Chemicals	per	July 17, 1919. £	s.	d.		£	s.	d.
Acetic anhydride	lb.	0	3	6	to	0	3	9
Acetone, pure	ton	95	0	0	to	97	0	0
Acid, Acetic, glacial, 99-100%	ton	77	10	0	to	80	0	0
Acetic, 80% pure	ton	62	10	0	to	65	0	0
Carbolic, crystal, 39-40%	lb.	0	0	6	to	0	0	7
Citric	lb.	0	4	4	to	0	4	5
Lactic, 50% vol.	ton	68	0	0	to	70	0	0
Lactic, 60% vol.	ton	85	0	0	to	87	10	0
Oxalic	lb.	0	1	2½	to	0	1	3
Pyrogallic cryst.	lb.	0	10	3	to	0	10	6
Tannic, coml.	lb.	0	2	9	to	0	3	0
Tartaric	lb.	0	3	3	to	0	3	4
Alum, lump	ton	17	10	0	to	17	15	0
Aluminium sulphate, 14-15%	ton	13	10	0	to	14	0	0
Aluminium sulphate, 17-18%	ton	17	0	0	to	17	10	0
Ammonia, anhydrous	lb.	0	1	8	to	0	1	9
.880	ton	32	10	0	to	37	10	0
Carbonate	lb.	0	0	6½				
Muriate	ton	46	0	0	to	48	0	0
Nitrate	ton	55	0	0	to	57	10	0
Phosphate	ton	112	0	0	to	115	0	0
Arsenic, white 99-100%	ton	40	0	0	to	42	0	0
Barium, Carbonate, 92-94%	ton	11	0	0	to	12	0	0
Chloride	ton	26	10	0	to	27	0	0
Nitrate	ton	51	0	0	to	52	0	0
Sulphate (blanc fixe), dry	ton	25	10	0	to	26	0	0
Sulphate (blanc fixe), pulp	ton	15	10	0	to	16	0	0
Bleaching powder, 35-37%	ton	13	0	0	to	13	10	0
Borax crystals	ton	44	0	0	to	45	0	0
Calcium acetate, grey	ton	19	0	0	to	19	10	0
Calcium chloride	ton	9	0	0	to	9	10	0
Casein, technical	ton	82	0	0	to	85	0	0
Cobalt oxide, black	lb.	0	7	9	to	0	8	0
Copper sulphate	ton	45	0	0	to	47	0	0
Cream Tartar, 98-100%	ton	235	0	0	to	240	0	0
Epsom Salts (see Magnesium Sulphate)								
Iron, perchloride	ton	32	0	0	to	34	0	0
Sulphate (copperas)	ton	4	15	0	to	4	17	6
Lead, Acetate, white	ton	82	10	0	to	85	0	0
Carbonate (White Lead)	ton	51	0	0	to	55	0	0
Nitrate	ton	58	0	0	to	59	0	0
Lithopone, 30%	ton	42	0	0	to	43	0	0
Magnesium, Chloride	ton	15	0	0	to	16	0	0
Carbonate, light	cwt.	3	0	0	to	3	5	0
Sulphate (Epsom salts, coml.)	ton	11	10	0	to	12	10	0
Magnesium Sulphate (druggist's)	ton	17	0	0	to	18	0	0
Methyl Acetone	ton	89	0	0	to	90	0	0
Methyl Alcohol, 1% Acetone	gall.	0	9	0	to	0	9	6
Potassium, Bichromate	lb.	0	1	6	to	0	1	7
Carbonate, 90%	ton	92	0	0	to	95	0	0

	per	£	s.	d.		£	s.	d.
Chlorate	lb.	0	1	2	to	0	1	3
Metabisulphite, 50-52%	ton	210	0	0	to	220	0	0
Nitrate refined	ton	58	0	0	to	60	0	0
Permanganate	lb.	0	3	6	to	0	3	9
Prussiate, yellow	lb.	0	1	9	to	0	1	10
Prussiate, red	lb.	0	6	0	to	0	6	3
Sulphate	ton	37	10	0	to	40	0	0
Sal. Ammoniac, firsts	cwt.	4	0	0				
Sal. Ammoniac, seconds	cwt.	3	15	0				
Sodium, Acetate	ton	55	0	0	to	57	10	0
Arseniate, 45%	ton	47	0	0	to	47	10	0
Bicarbonate	ton	9	0	0	to	9	10	0
Bisulphite, 60-62%	ton	28	0	0	to	29	0	0
Chlorate	lb.	0	0	8½	to	0	0	9
Caustic, 70%	ton	20	0	0	to	20	10	0
Caustic, 76%	ton	23	10	0	to	24	0	0
Hyposulphite, coml.	ton	17	0	0	to	18	10	0
Nitrite, 96-98%	ton	58	10	0	to	60	0	0
Phosphate cryst.	ton	25	0	0	to	25	10	0
Prussiate	lb.	0	0	7½	to	0	0	8
Sulphide, cryst.	ton	15	10	0	to	16	0	0
Sulphide, solid, 60-62%	ton	22	0	0	to	23	10	0
Sulphite, cryst.	ton	11	0	0	to	11	10	0
Strontium, Carbonate	ton	85	0	0	to	90	0	0
,, Sulphate, white	ton	8	10	0	to	10	0	0
Sulphur, chloride	ton	38	0	0	to	40	0	0
Tetrachlorethane (Westron)	ton	60	0	0	to	65	0	0
Tin perchloride, 33%	lb.	0	2	4	to	0	2	5
,, Protochloride (tin crystals)	lb.	0	1	8	to	0	1	9
Trichlorethylene (Westrosol)	ton	75	0	0	to	80	0	0
Zinc, chloride, 102 Tw.	ton	22	0	0	to	23	0	0
Chloride, solid, 96-98%	ton	60	0	0	to	62	10	0
Sulphate	ton	21	10	0	to	23	0	0
Oxide, Fedseal	ton	80	0	0	to	85	0	0

Coal Tar Intermediates, &c.

	per	£	s.	d.		£	s.	d.
Alphanaphthol, crude	lb.	0	3	0	to	0	3	6
Alphanaphthol, refined	lb.	0	3	6	to	0	3	9
Alphanaphthylamine	lb.	0	2	6	to	0	2	9
Aniline oil, drums free	lb.	0	1	2	to	0	1	3
Aniline salts	lb.	0	1	3½	to	0	1	4
Anthracene, 80%	lb.	0	2	6	to	0	2	9
Benzaldehyde (free of chlorine)	lb.	0	9	0	to	0	9	6
Benzidine, base	lb.	0	5	6	to	0	6	0
Benzidine, sulphate	lb.	0	4	9	to	0	5	0
Benzoic, acid	lb.	0	5	0	to	0	5	3
Benzoate of soda	lb.	0	5	0	to	0	5	3
Benzyl chloride, technical	lb.	0	2	0	to	0	2	3
Betanaphthol benzoate	lb.	1	6	0	to	1	7	6
Betanaphthol	lb.	0	2	1	to	0	2	3
Betanaphthylamine, technical	lb.	0	6	6	to	0	7	0
Dichlorbenzol	lb.	0	0	5	to	0	0	6
Diethylaniline	lb.	0	7	0	to	0	8	0
Dinitrobenzol	lb.	0	1	4	to	0	1	6
Dinitrochlorbenzol	lb.	0	1	2	to	0	1	3
Dinitronaphthaline	lb.	0	2	0	to	0	2	3
Dinitrotoluol	lb.	0	1	10	to	0	2	0
Dinitrophenol	lb.	0	1	10	to	0	2	0
Dimethylaniline	lb.	0	2	9	to	0	3	0
Diphenylamine	lb.	0	3	0	to	0	3	3
H-Acid	lb.	0	7	6	to	0	8	0
Metaphenylenediamine	lb.	0	4	6	to	0	4	9
Monochlorbenzol	lb.	0	0	9	to	0	0	10
Naphthionic acid, crude	lb.	0	3	6	to	0	3	9
Naphthylamin-di-sulphonic acid	lb.	0	4	6	to	0	5	0
Nitronaphthaline	lb.	0	1	2	to	0	1	6
Nitrotoluol	lb.	0	1	3	to	0	1	6
Orthoamidophenol	lb.	0	18	0	to	1	0	0
Orthodichlorbenzol	lb.	0	1	1	to	0	1	3
Orthotoluidine	lb.	0	2	0	to	0	2	3
Orthonitrotoluol	lb.	0	1	6	to	0	1	9
Para-amidophenol, base	lb.	0	14	0	to	0	15	0
Para-amidophenol, hydrochlor.	lb.	0	15	6	to	0	16	0
Paradichlorbenzol	lb.	0	0	4	to	0	0	5
Paranitraniline	lb.	0	4	0	to	0	4	6
Paranitrotoluol	lb.	0	5	3	to	0	5	6
Paraphenylenediamine, distilled	lb.	0	14	0	to	0	15	0
Paratoluidine	lb.	0	7	0	to	0	7	6
Phthalic, anhydride	lb.	0	14	0	to	0	15	0
Resorcin, technical	lb.	0	15	0	to	0	16	0
Resorcin, pure	lb.	0	17	6	to	1	0	0
Salicylic acid	lb.	0	1	11	to	0	2	0
Salol	lb.	0	4	3	to	0	4	9
Sulphanilic acid, crude	lb.	0	1	2	to	0	1	3
Toluidine, base	lb.	0	9	0	to	0	10	0
Toluidine, mixture	lb.	0	2	9	to	0	3	0

Neutral Sulphate of Ammonia

To the Editor of THE CHEMICAL AGE

SIR,—In the issue of the 12th inst. of your valuable Journal, your correspondent refers to our exhibit at the British Products Exhibition, and compares, somewhat disparagingly, some of the samples of neutral sulphate of ammonia shown by us, with the sulphate produced by the South Metropolitan Gas Company. Our exhibit is intended to demonstrate how the quality of ordinary acid and discoloured gas works and colliery products can be improved by the Linder-Lessing process, and the samples should therefore be compared, not with a high-grade sulphate made under official control, but with the original salts from which they have been produced, some of which are of rather low grade. There is just a possibility that your correspondent mistook the untreated samples shown by us for finished products.

As regards chemical characteristics, all the treated samples shown by us come up to the highest standard. Where stress is laid on colour our plant will produce a perfectly white, and at the same time, neutral and granular salt. Thanking you for allowing us your valuable space for this explanation.—Yours faithfully,

GEORGE S. PITT,
Secretary,

The Hydronyl Syndicate,
140, Leadenhall Street, E.C.3,
July 16th, 1919.

[We gladly publish this letter. There was, of course, no intention of referring unfavourably to the Company's exhibit, and we regret if this impression was inadvertently conveyed.—ED. *C.A.*]

Obituary

VICKERS.—Mr. Albert Vickers, who resigned the chairmanship of Vickers, Ltd., last year, at the age of 80, died at Eastbourne on Saturday. Mr. Vickers was born at West Lodge, Sheffield, in September, 1838, son of Edward Vickers, a partner in a Sheffield steel-making business, and, after being educated at Hamel-on-the-Weser, entered his father's business in 1854. After a few years at Boston, U.S.A., he returned to this country to join his brother, the late Colonel T. E. Vickers, taking over the commercial affairs while Colonel Vickers devoted his undoubtedly great engineering ability to developing the technical side. In addition to being head of the Vickers firm, Mr. Albert Vickers was also chairman of the Harvey United Steel Company, and was on the board of several other companies, such as the Alby United Carbide Factories, the Whitehead Torpedo Works (Weymouth), William Beardmore & Co., and others, of which it may be said generally that they are allied in some respect to the Vickers Company.

FISCHER.—The death is announced, at the age of 67, of the well-known German chemist, Herr Emil Fischer. Born at Euskirchen in 1852, Herr Emil Fischer was, perhaps, the most distinguished German organic chemist of his time. He studied at Bonn and Strassburg, and after spending eight years at Munich as assistant to von Bäyer, held the chair of chemistry successively at Erlangen and Wurzburg. Finally, in 1892, he followed A. W. von Hofmann as Professor of Chemistry at Berlin. Under him the chemical school there prospered exceedingly, and attracted students from all over the world. He devoted himself to the investigation of some of the most complicated substances that organic chemistry can offer to the attention of its votaries. After elucidating the constitution of the rosaniline dyestuffs, he turned to uric acid and allied compounds, and in a long series of researches connected them with a nitrogenous base, the so-called purin, which he succeeded in preparing, together with a great number of its derivatives. The sugars were another chemical group which he attacked successfully, determining their constitution, and preparing many of them synthetically, and from them he was led to the ferments and enzymes; but perhaps his work on the proteins forms the outstanding feature of his life's work. Among other honours, he was awarded the Nobel Prize for chemistry in 1902.

Company News

ANGLO-BOLIVIAN RUBBER ESTATES.—The report for the year to June 30 states that the production has been increased beyond the results of previous years, and, though the prices of rubber and freight, on the other hand, have been adverse, yet the profits have been more than maintained. The net profit amounted to £11,971, which with £2,529 brought forward, makes £14,500. The directors recommend a final dividend of 10 per cent., making with the interim already paid 15 per cent. for the year; they also propose the payment of an interim dividend of 5 per cent. for the year ended June 30, 1919. Both dividends will be payable at an early date.

BRITISH DYESTUFFS CORPORATION.—It is understood that the prospectus of the British Dyestuffs Corporation, Ltd., will be issued at the end of this week. The corporation has been formed to acquire all or any part of the assets and undertakings of the British Dyes, Ltd., and Levinstein, Ltd., the capital being £10,000,000 and the present issue 2,500,000 7 per cent. preference shares and 2,500,000 8 per cent. preferred ordinary shares.

BRITON FERRY CHEMICAL AND MANURE CO., LTD.—Interim dividend of 1s. 6d. per share on the fully paid ordinary shares, and 4½d. per share on the new shares, on which 5s. per share has been paid (less income-tax), to be payable on July 24. This is at the same rate as that of a year ago.

EBBW VALE STEEL, IRON, AND COAL CO.—Directors are unable to present a profit-and-loss account and balance-sheet in respect of the two financial years ended March 31, 1918, and March 31, 1919, respectively, in consequence of the difficulty experienced with regard to questions arising out of excess profits duty, munitions levy, and coal mines control finance, which, until definitely settled with the authorities, render it impracticable to state with accuracy the profits for the past two financial years. The directors are, however, advised they are justified in recommending the payment of a final dividend on the preference shares at the rate of 7 per cent. per annum in respect of the six months ended March 31, and the payment of an interim dividend on the ordinary shares at the rate of 15 per cent. per annum, in respect of the twelve months ended March 31. It is not their intention, however, to recommend any further dividend on the ordinary shares in respect of the financial year just ended. The development of the iron ore bearing lands in Northamptonshire has made excellent progress during the year, and the calcining kilns have commenced working. It is expected the property will become fully productive during the current financial year. The output of the collieries during the year amounted to 1,591,993 tons, which in comparison with the average of the five preceding years shows a decrease of 177,112 tons.

KYNOCH (LIMITED).—The directors in their report for the nine months ended December 28 last, report that they are not able to present the balance-sheet owing to the enormous amount of work which has had to be done in connection with the termination of the war, and the change over to peace conditions. They are satisfied from the figures put before them that the profit for the nine months is sufficient to enable them to pay a dividend of 14 per cent., subject to income-tax, on the amount paid up on the ordinary shares. Out of the 500,000 existing ordinary shares 495,789 have been exchanged for shares of Explosive Trades, and as the company has received no acknowledgment of any sort from the remaining shareholders, it is probable that the papers have been mislaid, and that most of them will ultimately be exchanged on the terms of the offer of Explosives Trades. Of the preference shares, 388,548 out of the 500,000 already existing have been exchanged for those of Explosives Trades. The experience gained during the time since the Armistice leads to the conclusion that the change over from war to peace conditions will take longer than was originally expected.

LIBIOLA COPPER.—Net profit for 1918 is £1,819, and £619 was brought in, making £2,438, which it is proposed to carry forward. As a consequence of difficulties due to the war, the production of pyrites was further reduced to some 4,000 tons, while mining costs increased 60 per cent. compared with 1917. Exploration work was carried on in very difficult circumstances, and reserves show a reduction of 990 tons of copper ore and 11,000 tons of pyrites. The rate of exchange at the beginning of 1918 was lire 39, and during the year it reached lire 43½, closing at lire 30¾. The mine has been closed down since January, 1919, pending a solution of the labour troubles, and, unfortunately, the demand for pyrites has considerably fallen away since the Armistice, so that it is impossible to say when work can be profitably resumed.

MOND NICKEL.—The directors recommend payment to shareholders, on the books on July 7, of dividends for the year ended April 30, 1919, of 7 per cent. on the cumulative and non-cumulative preference shares, less tax at 6s. in the £, and 3s. 6d. per share on the ordinary shares, free of tax, less interim dividend already paid.

SCOTTISH OIL COMBINE.—It is stated that negotiations are now in progress to weld the Scottish mineral oil companies into one large combination in association with the Anglo-Persian Oil Co. The new title of the concern will probably be the Scottish Oil Refineries, Ltd. Industrial conditions, increased costs generally, and higher wages have made the refining of oil from shale an operation no longer profitable and the Scottish companies, it is understood, have felt themselves constrained, in the interests of their shareholders, to consider favourably the offer made to them by the Anglo-Persian Co., and under the new arrangement they would confine themselves in a large measure to the refining of crude oil from the Persian fields.

TAMPICO-PANUCO OIL FIELDS.—The report for the period ended March 31 last states that on account of the sale of the company's assets to the Bataafsche Petroleum Maatschappij, a subsidiary company to the Royal Dutch and the Shell Transport Companies, the directors were not in a position during the period of transition to present the accounts until after the completion of the sale and the formation of the new Dutch Company. The balance sheet shows that, taking the value of the Dutch shares at their par value, there is a small debit of £1,163 to profit and loss. It is impossible to estimate the real value of these shares, in the absence of any market in them at present. The directors are acquiring new properties in Mexico of recognised value, and have succeeded in securing options on oil properties in Mexico now undergoing careful examination.

VAN DEN BERGHS.—An extraordinary general meeting of Van den Berghs, Ltd., was held last week at Winchester House, E.C., when resolutions to increase the capital to £3,075,000 by the creation of 1,000,000 new shares of £1 each, to be called "C" preference shares, and to confer upon the holders thereof the rights specified, were, after some discussion, agreed to by a large majority.

W. J. BUSH & CO.—There was a fairly substantial recovery in last year's earnings of W. J. Bush & Co., manufacturing chemists, Hackney. In 1917, after providing for debenture interest and depreciation, the net profit declined £23,000, to £56,978, but in 1918 it rose to £65,903. A year ago there were no special allocations, but this time £20,000 is to be placed to the general reserve fund, and £10,000 is to be written off goodwill. The ordinary dividend is to be maintained at 20 per cent., and the balance forward will be £35,258, as against £30,604, subject to excess profit duty for 1918.

Carbon Dioxide for Fire Apparatus

AN application was made in the Patents Court, London, on Thursday, July 10, to the Controller of Patents by the Citex Fire Extinguishing Co., Ltd., of Phipp Street, London, E.C., for a licence to use the German patent No. 10,086 of 1908, in the name of Roemer, for the production of carbon dioxide for use in fire-extinguishing apparatus. The patent claimed, in producing the carbon dioxide which exerts pressure in fire extinguishing apparatus, the application of a solution of substantially pure potassium carbonate of 96 to 98 per cent. strength.

Mr. A. J. P. Soar, the Secretary of the applicant company, stated that they had been manufacturing the chemical charge continuously for several years. Originally they had an arrangement with the patentee, although the arrangement had not been registered, and they had had to pay the patent renewal fees and a royalty of 1s. on each cartridge which sold at about 8s.

The Controller of Patents (Mr. H. Temple Franks) said that all the pre-war licences had gone and the applicants, if they wished to be protected, must apply to that Court. Application should have been made previously. There was the question of whether the arrangement under which they worked was a valid arrangement, and if that disappeared what was to happen? Mr. Soar said that they had been very busy and the fact was they could not get potash as very little had been available during the period of the war. The royalties were credited to the patentee in their office.

By Sir Cornelius Dalton (who sat with the Controller)—"Do you mean to pay him?" Mr. Soar—"We do not know. We do not want to pay anything that we need not pay." The Controller (who has recently returned from Paris) said that this might be a question under the Treaty of Peace. It would be raised afterwards. He thought the licence should be granted and other things would be arranged in time. He would recommend the grant of the licence by the Board of Trade.

Van den Bergh *v.* Maisel

The hearing of the action Van den Bergh v. Maisel was concluded before Mr. Justice P. O. Lawrence, in the King's Bench Division, last week. Mr. Jacob Van den Bergh, director of Van den Berghs, Ltd., claimed from Mr. Benno Maisel, trading as B. Maisel and Co., 10, Moorgate Street, E.C., the sum of £8,307. 4s. 3d. in respect of nine bills of exchange. The bills were drawn by defendant, accepted by E. T. Boxall & Co., and endorsed by the plaintiff. E. T. Boxall is dead and the bills have been dishonoured. The defendant said he received no benefit from the proceeds of these bills, which, he alleged, were put through solely for the accommodation of Boxall, who before he died became bankrupt. This was denied by the plaintiff, who said the transactions were solely for the benefit of Maisel and his various oil companies. Judgment was given for plaintiff for the amount of the bills, plus 5 per cent. interest and costs. Mr. Du Parcq, on behalf of the defendant, asked for a stay of execution pending a decision as to whether defendant should appeal. Mr. Holman Gregory, K.C., said the amount altogether would exceed £12,000, and subject to payment into court of £6,000 he would not oppose. His Lordship granted the stay on those terms.

Commercial Intelligence

The following are taken from printed reports, but we cannot be responsible for any errors that may occur.

LONDON GAZETTE

Notice of Return to Contributories

SCHLIEMANN'S OIL AND CERESINE CO., LTD., London, House, 3, New London Street, London, £19 13s. per share. First and final. Any day (except Saturday) between 11 and 2, at the office of the Official Receiver and Liquidator, 33, Carey Street, Lincoln's Inn, London, W.C.

Liquidator's Notice

BOUNDARY CHEMICAL CO., LTD.—A meeting of creditors will be held at 31, North John Street, Liverpool, on July 25, at 11 a.m. Harold Sadler, liquidator.

Company Winding Up Voluntarily

THE PHŒNIX CHEMICAL CO., LTD.—Alfred Herbert Matthews, Bridge House, 181, Queen Victoria Street, London, E.C., appointed liquidator for the winding-up of the company for reconstruction purposes.

New Companies Registered

The following list has been prepared for us by Jordan & Sons, Ltd., company registration agents, 116 and 117, Chancery Lane, London, W.C. :—

CROSBY TRADING CO., LTD., Alderman House, Bishopsgate, E.C., chemical merchants and manufacturers. Nominal capital £5,500 in 5,000 preference shares of £1, and 10,000 ordinary shares of 1s. Directors to be appointed by Subscribers. Qualification of Directors, 1 share. Remuneration of Directors, £50. Chairman, £75.

FORD, COOK & CO., LTD., 6, Well Street, E.C.1. To carry on business of importers, exporters, manufacturers, and dealers in surgical dressings, instruments, chemists' sundries, &c. Nominal capital £10,000 in 5,000 10 per cent. preference shares of £1, and 5,000 ordinary shares of £1 each. Directors: T. H. Ford, 61, Holden Road, Woodside Park, N.12; H. J. J. Cook, 37, Camberland Road, Acton, W.3. Qualification of Directors, £750. Remuneration of Directors to be voted by company in general meeting.

BROUGHTON DYE MANUFACTORY, LTD., manufacturers of artificial and natural dyes. Nominal capital £2,000 in 2,000 shares of £1 each. Directors: J. F. Gleave, 28, Duke Street, Lower Broughton, Manchester; S. Gamaji, 27, Railway Road, Urmston. Qualification of Directors, 1 share. Remuneration of Directors to be voted by company in general meeting.

J. C. BOTTOMLEY & EMERSON, LTD., Brookfoot Works, Brighouse, chemical manufacturers, manufacturers of coal tar, dyestuffs, &c. Directors: J. F. Bottomley, Stoneleigh, Brighouse; L. Emerson, 6, Leicester Terrace, Manor Drive, Halifax. Qualification of Directors, £200. Remuneration of Directors to be voted by company in general meeting.

PINNINGTON, WOOD & CO., LTD., 796, Deansgate, Manchester, analytical, pharmaceutical dispensing, consulting manufacturing chemists. Nominal capital £3,000 in 3,000 shares of £1 each. Directors: W. A. Pinnington, H. R. Wood. Qualification of Directors, £200. Remuneration of Directors to be voted by company in general meeting.

HANDSWORTH LEATHER GOODS CO., LTD., College Works, Oxhill Road, Handsworth, Birmingham, leather goods manufacturers. Nominal capital £3,000 in 3,000 shares of £1 each. Directors: H. T. Muchall, 80, Oxhill Road, Handsworth, Birmingham; A. H. Muchall, 80, Oxhill Road, Handsworth, Birmingham. Qualification of Directors, 50 shares. Remuneration of Directors to be voted by company in general meeting.

CARBON SMOKELESS FUEL, LTD., 5, Albany Court Yard, Piccadilly, W. To acquire coalmines, coal, coke, and similar substances, coal gas, and all chemical substances necessary for the manufacture of benzol, and sulphate of ammonia. Nominal capital £75,000 in 75,000 shares of £1 each. Minimum subscription, 7 shares. Directors to be appointed by Subscribers. Qualification of Directors, 500 shares. Remuneration of Directors, £100.

CORNISH MELEDOR CHINA CLAY COMPANY, LTD., china clay, brick, stone and glass manufacturers. Nominal capital, £50,000 in 15,000 cumulative preference shares of £1 and 15,000 par. preference shares of £1, and 20,000 ordinary hsares of £1 each. Minimum subscription, 1s. per share. Directors: D. G. Collins, Windmill House, Shirley Park, Croydon, Surrey; J. B. Davidson, 142, Hamilton Place, Aberdeen; J. Scott, 26, Forest Road, Aberdeen; J. Samson, "Balwyllo," Montrose. Qualification of Directors, 200 ordinary shares. Remuneration of Directors, £105.

Bankruptcy Proceedings

John Thomas Hall, drysalter, 28 and 30, Bolton Road, Atherton, Lancaster, late 1, Wilkinson Street, and 55, Bradshawgate, Leigh, Lancaster applied at the Court House, Mawdsley Street, Bolton, on July 9 for his discharge from bankruptcy. The Official Receiver told Judge Spencer Hogg that the receiving order was made on March 30, 1905, on the debtor's own petition. The liabilities expected to rank for dividend were estimated at £1,798, and the assets realised £210. The debtor's father had carried on business as a chemist and dry salter at 55, Bradshawgate, Leigh. In 1898 the debtor took this business over and agreed to pay £722 for the stock, &c., by instalments of £50 a year. The business was very unsuccessful from the first. The debtor was unable to pay anything to his father; on the contrary, he borrowed £120 from him. In the result his father's claim as stated, was held to be unprovable so far as it related to the business acquired by the debtor, but was admitted for the cash advanced and interest. As he was unable to make the business pay at Leigh, the debtor, with a view to reducing standing charges, decided to give up the retail business and confine himself to the wholesale, and in further pursuance of the idea removed to Atherton about twelve months before the date of the receiving order. He did succeed in reducing his expenses, but the change came too late to save him. There was no evidence of personal extravagance. Mr. Dootson, for the debtor, emphasised this latter comment and added that his client was at present maintaining himself and wife by going rounds in connection with the same business and making between £2 and £3 a week. Discharge was granted subject to two years suspension.

Notices

(Three lines 3s.: each additional line 1s.)

G. R.

BY DIRECTION OF THE DISPOSAL BOARD
MINISTRY OF MUNITIONS

Note:—For Detailed list of all Surplus Government Property for sale apply at the nearest Bookstall or to the Director of Publicity, Ministry of Munitions, Whitehall Place, S.W., for "SURPLUS", Price 3d.

BENZOL RECOVERY PLANT FOR DISPOSAL.

The Ministry of Munitions has for sale several Installations for the recovery of Benzol, Toluol, and Solvent Naptha. Tenders are invited for their purchase, preferably for each as a complete plant, although consideration will be given to offers made for the various parts of the plants.

The Installations for sale are of varying capacities and include both Extraction and Distillation Plants, in some cases designed for the manufacture of washed rectified products only. The Plants vary in size from one capable of dealing with the Gas from 400 tons of coal per day to one capable of dealing with Gas from 1,000 tons. Certain of the Plants have a continuous Fractionating System embodied.

For further particulars, apply to the MINISTRY OF MUNITIONS OF WAR, DEPARTMENT OF EXPLOSIVES SUPPLY, COUNCIL HOUSE, BIRMINGHAM.

DIATOMITE - KIESELGUHR. Advertisers carry stocks of White, Grey and Pink qualities, and invite inquiries from buyers to Box No. 8, CHEMICAL AGE Offices, 8, Bouverie Street, E.C.4.

For Sale or Wanted

(Three lines, 3s.; each additional line, 1s.)

WANTED at once 100 kg. Pepsin, T.100, and 1000 kg. green powdered Gall (Bile). Send samples and price, post paid—middle men not wanted—S. Z., 1, Rue Gabrielle, Paris, France.

WANTED.—Small Iron or Steel-jacketted Autoclave or Pan with Cover, with or without stirring appliance, capacity 1 to 3 gallons. Reply to "S.", 20, Page Heath Lane, Bickley, Kent.

Situations Wanted

(Twenty-seven words, 2s.; every additional nine words, 6d.)

METALLURGIST and TECHNICAL CHEMIST, Assoc. Inst. M. M., M. Soc. Chem. Ind., wishes Partnership, or Situation with view to same in chemical manufacture, or any new venture with reasonable chance of success. 24 years' experience at home and abroad; knowledge engineering, electricity, and office management; languages, French and Portuguese; good organiser.—Box No. 9, CHEMICAL AGE Offices, 8, Bouverie St., E.C.4.

SCIENTIFIC BOOKS AND SERIALS

JOHN WHELDON & CO. have the largest stock in the country of Books in all departments of Science (including a large selection on pure and applied Chemistry) and Natural History, also Transactions and Journals of Learned Societies, etc., in sets, runs, and single volumes or numbers.

Libraries or small parcels purchased.

38 GREAT QUEEN STREET, KINGSWAY, LONDON, W.C.2

Telephone: Gerrard 1412.